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CIRCULATES IN PROVINCE IN CANADA

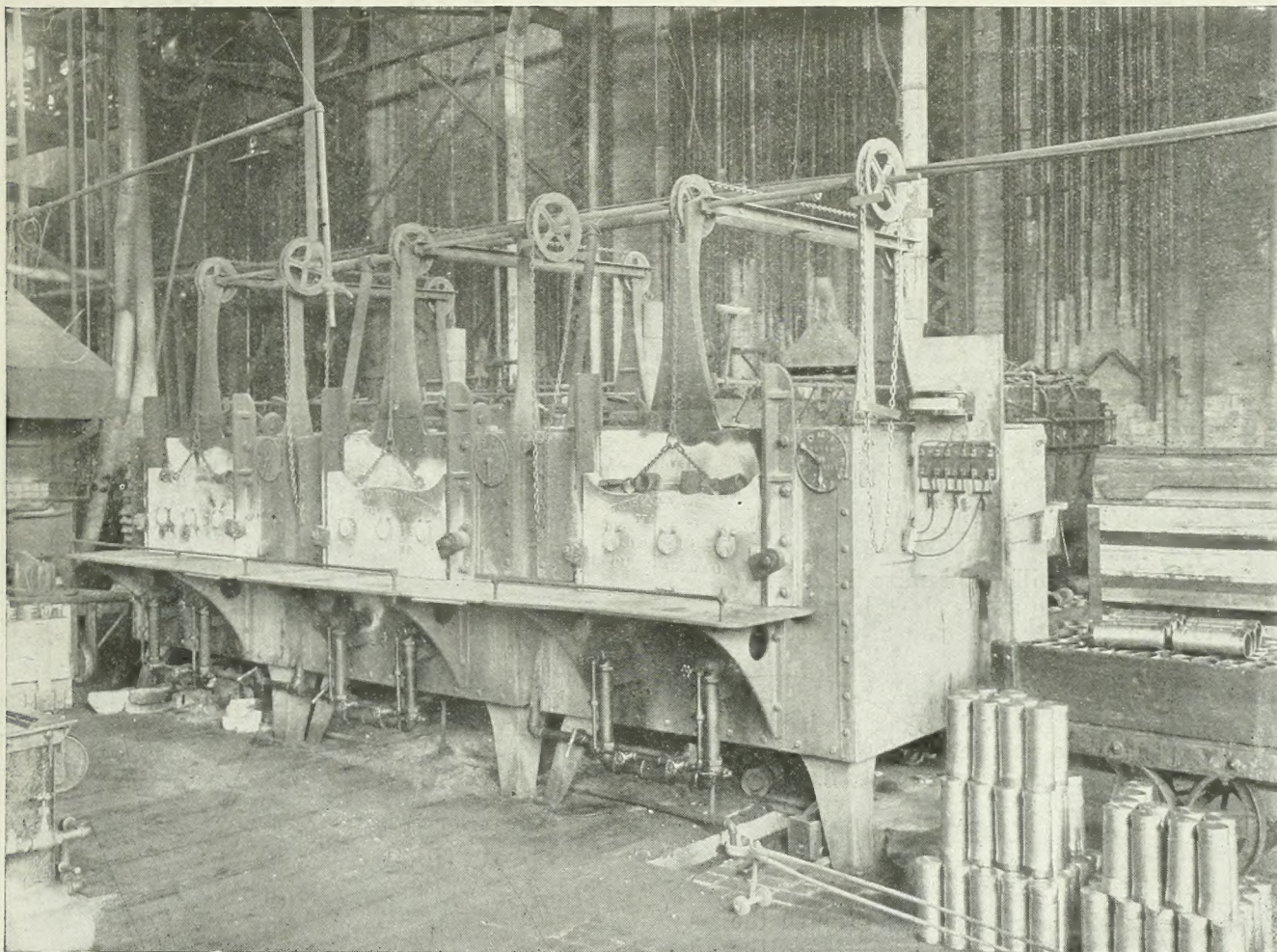
# CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV

Publication Office: Toronto, August 5, 1915

No. 6



PHOTOGRAPH SHOWS ONE OF SEVERAL TYPES OF  
FRANKFORT FURNACES NOW IN OPERATION IN  
CANADA AND THE UNITED STATES FOR  
MANUFACTURING MUNITIONS

**The Strong, Carlisle & Hammond Company**  
CLEVELAND, OHIO

CANADIAN AGENTS:

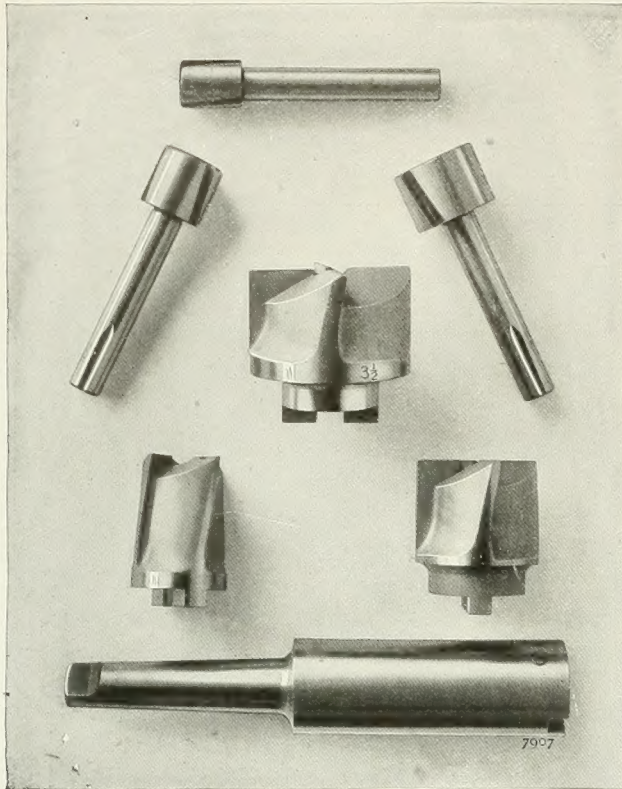
**THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED**

Montreal St. John Toronto Winnipeg Calgary Saskatoon Vancouver

Frankfort  
Shell Treating  
Furnaces  
No. 118  
in the plant  
of one of  
the largest  
Manufacturers  
in Canada



# Make Your Own Combination



For every counterboring job you can make immediately the right combination of holder, cutter and guide if your tool room is equipped with

## P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.

### Holder

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

### Guides

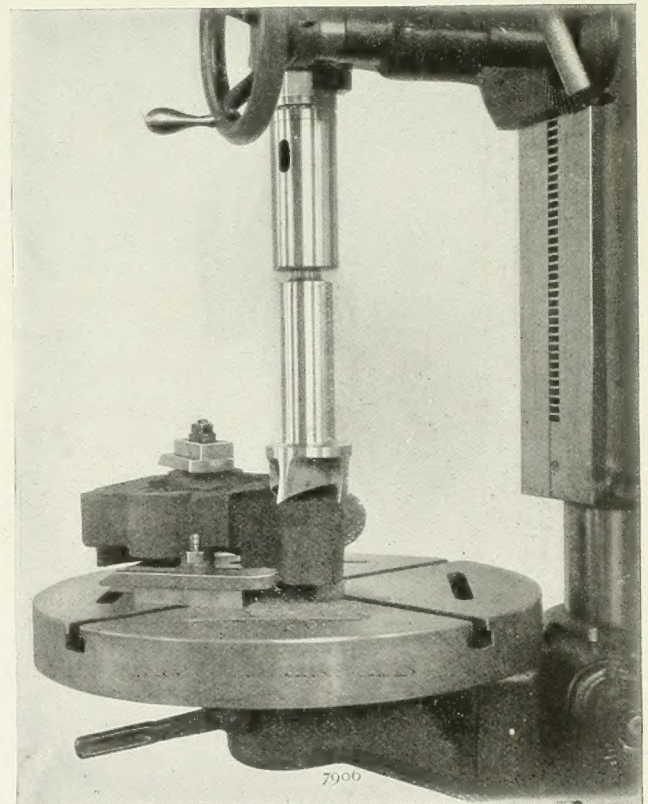
Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

### Cutters

Can be furnished of either carbon or high speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools"  
showing our complete line.



Spot Facing  
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

## Pratt & Whitney Company of Canada, Limited

DUNDAS  
Ontario

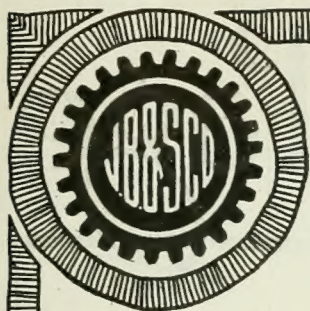
MONTREAL  
723 Drummond Bldg.

WINNIPEG  
Bank of Hamilton Bldg.

VANCOUVER  
B.C. Equipment Co.

*The advertiser would like to know where you saw his advertisement—tell him.*





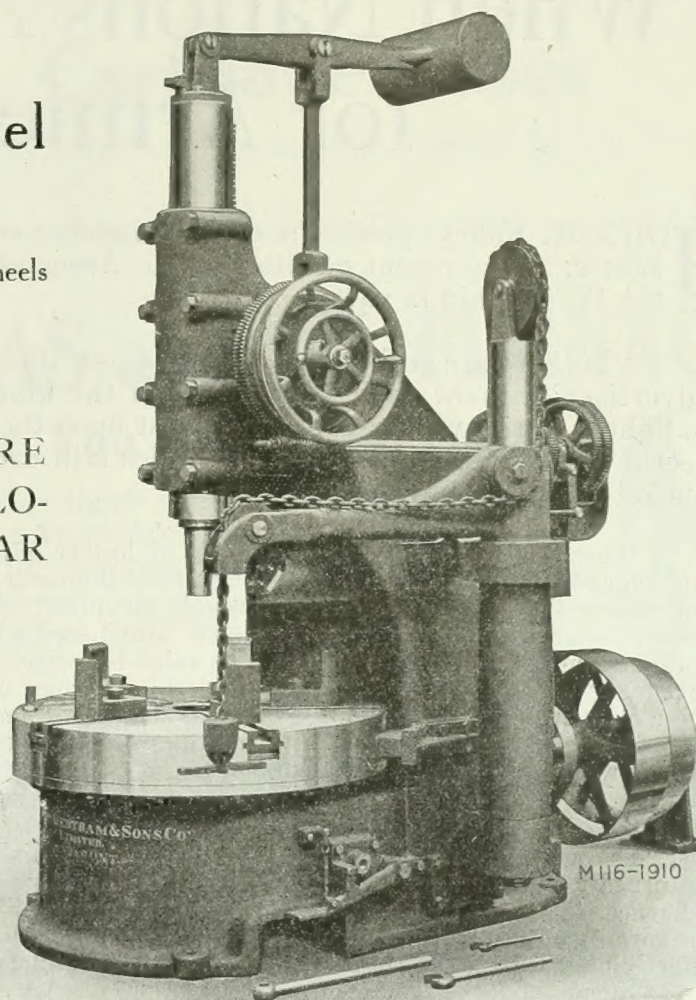
# BERTRAM MACHINE TOOLS

## 42" Car Wheel Borer

Equipped with Air Crane for Wheels

WE MANUFACTURE  
A FULL LINE OF LO-  
COMOTIVE AND CAR  
SHOP MACHINERY.

Write us about the  
machine or machines  
in which you are  
interested — we  
gladly send photo-  
graphs and full  
specifications.



## The John Bertram & Sons Co.

Limited

DUNDAS

ONTARIO

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MONTREAL  
723 Drummond Bldg.

VANCOUVER  
609 Bank of Ottawa Bldg.

WINNIPEG  
1205 McArthur Bldg.

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# The Publisher's Page

By B.G.N.

## "When Nations Advertise for Armies"

**J**OHAN H. Fahey, president of the Chamber of Commerce of the United States, at the recent meeting of the Associated Advertising Clubs of the World, said in part:

"If there are still extant men who ask the question, 'Does it pay to advertise?' I know their thinking is of the kind which would lead them to light factories with candles and insist upon the advantages which would accrue if the residents of modern cities still drew their water supply by bucket from the town well.

"When nations in the greatest struggle of history advertise for armies; when kings and emperors and sultans come down from their thrones to seek the attention of the world and present their pleas and defenses through the press; when it has become the daily bread of a large part of the world's business, it is indeed a man of limited mentality who still questions the power of publicity. Its value to society has in fact so impressed itself that to-day publicity is the light of the world. It may be said, with little element of speculation in the assertion, that if publicity had characterized dealings between the nations of Europe during the last fifty years, and secret diplomacy had been eliminated, the present world war, with its terrorism and threat to all civilization, would not now be raging.

"The power by which hundreds of thousands of minds, yes, millions of minds, may be turned to consideration of the same thing at the same time is a wonderfully useful influence. Whether that power is employed to make millions think of the policies of the government or the homely comforts and economies affecting their daily lives, the underlying value of this power is the same; the advantages to be gained from its use are identical.

"It is often contended that you cannot advertise successfully when business is bad, but the extent to which confidence may be restored and enthusiasm reawakened by enterprising advertisers under adverse conditions was demonstrated again and in remarkable ways during the period of uncertainty which prevailed in our own country immediately after the first of last August. Once more it has been shown that the public demand for commodities always exists in greater or less degree. It is simply a question of brains and ingenuity in securing response under conditions a little harder than usual."

**Canadian Machinery and Mfg. News**

143-153 UNIVERSITY AVE.

TORONTO, ONTARIO





## Making Cartridge Cases

for rapid-fire guns requires some rather complex drawing operations, together with a larger number of annealing treatments.

If your work includes similar operations—scores of Canadian plants are devoting their attention to making munitions of war.

## STEWART GAS and OIL FURNACES

**Will Save You Money on Them**

In the making of a 6-in. cartridge there are eleven annealing operations and Stewart Ovens or Annealing Furnaces will save money on every one of them—1st, because they heat quickly; 2nd, because they hold the exact heat required indefinitely; 3rd, because they are very economical in their fuel consumption.

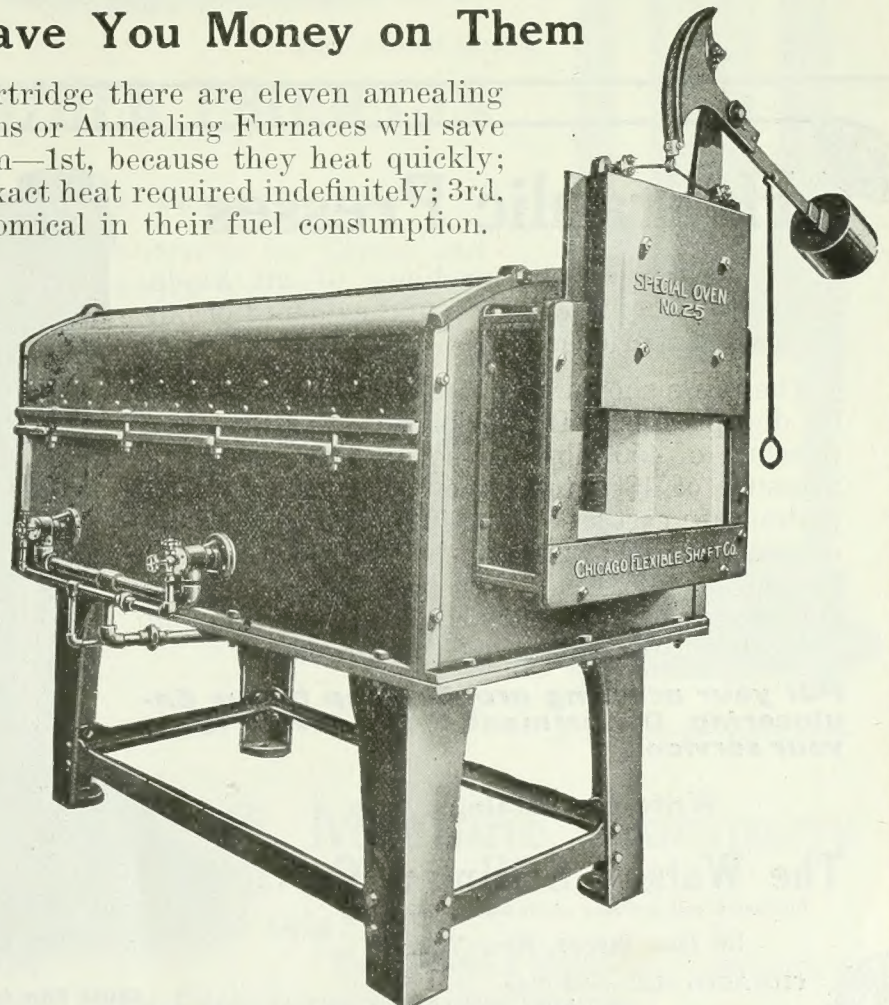
Whatever your requirements we can fill them.

Besides our standard types we are well equipped to design and build furnaces to handle any special requirements in the heat treatment of metals.

### We Offer

to prove every statement at our own expense. We will send any Stewart furnace you may select for a thirty days' **FREE** trial. Don't pay a cent unless it lives up to the guarantee. Write for details.

**Chicago Flexible Shaft Company**  
210 to 230 Ontario St., Chicago, Ill.



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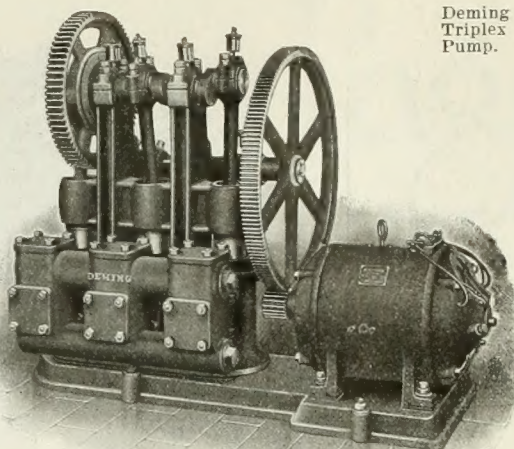
# Are You Making Shells?

Good pumping machinery is essential to the greatest output. We manufacture steam and power pumps for every kind of service.

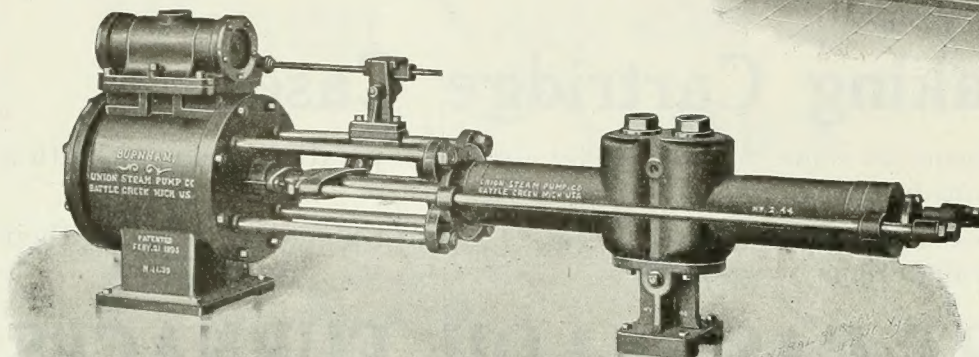
## Darling Brothers Limited

Toronto MONTREAL Winnipeg

MADE IN CANADA



Deming  
Triplex  
Pump.



Burnham Hydraulic Pump

We are  
manufacturing  
special machines  
used in shell  
making.

**TELL US WHAT  
YOU NEED.**



# Hydraulic Presses

We build hydraulic machines of all kinds. In every machine will be found evidence of our 60 years' experience.

The press shown here is one of our large line of die presses. It works with a hydraulic pressure of 4500 lbs. per sq. in. and exerts a pressure of 1800 tons upon the platens. The platens are cast steel 42 x 42 in. square, and the columns are of forged steel. The operation is simple and effective. We have patterns for a full line of forging, shell drawing, forming and projectile capping and banding presses.

**Put your pressing problems up to our Engineering Department. Its advice is at your service.**

Write for catalogs.

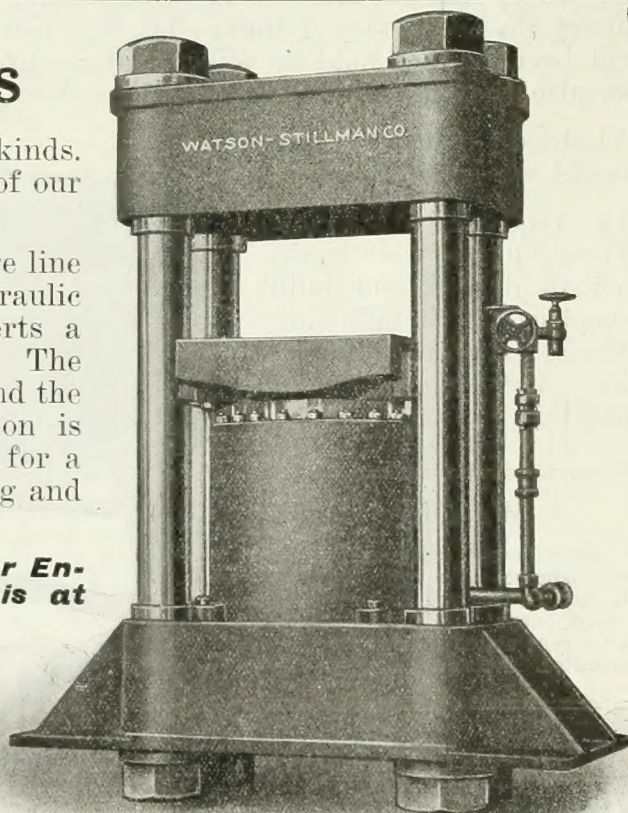
## The Watson-Stillman Co.

Engineers and Builders of Hydraulic Machinery

36 Dey Street, New York

CHICAGO: McCormick Bldg.

PHILADELPHIA: The Bours



1800 Ton Hydraulic Die Press

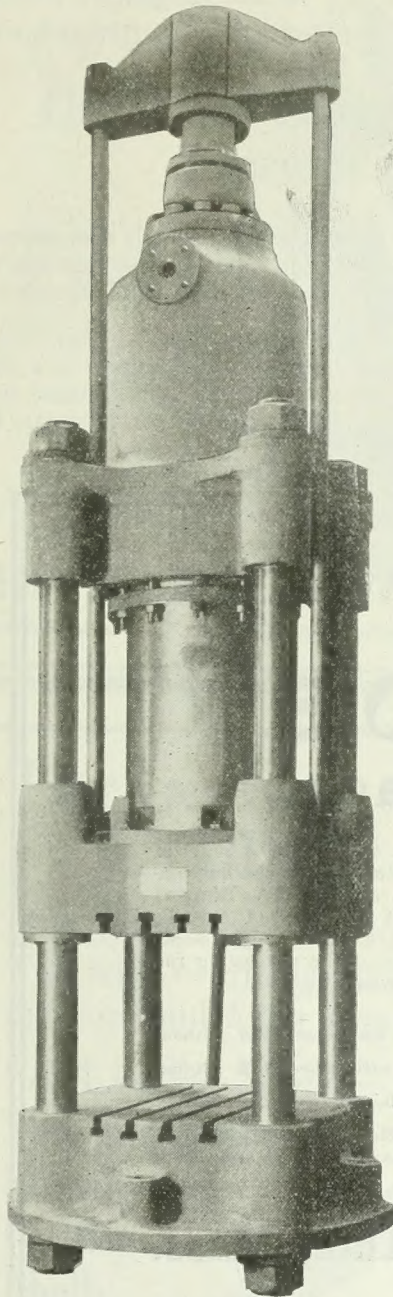
240



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# 1836 SOUTHWARK 1915 HYDRAULIC MACHINERY



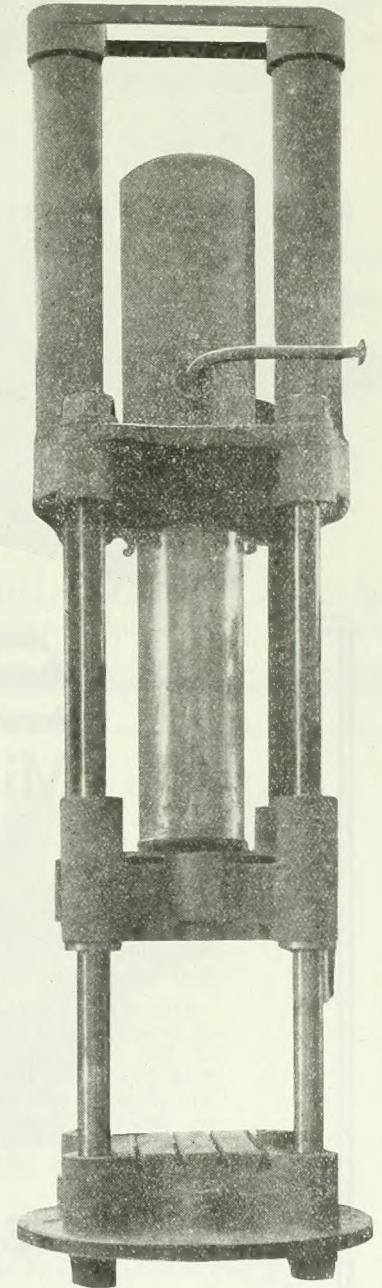
350 ton  
Shell Piercing and Forging Press

## FOR ALL PURPOSES

Presses	Pumps
Riveters	Accumulators
Cranes	Hoists
Intensifiers	Jacks
Leather Packings	Pipe Fittings
Gauges	Valves
Etc.	Etc.

## OTHER PRODUCTS

Centrifugal Pumps.  
 Turbo Generators for Direct and Alternating Current.  
 Turbo Blowers.  
 Turbo Pumps.  
 Surface and Jet Condensers with their Auxiliaries.  
 Southwark-Harris Valveless Oil Engine.



210 ton Shell Drawing Press

# Southwark Foundry & Machine Company

PHILADELPHIA

Founded 1836

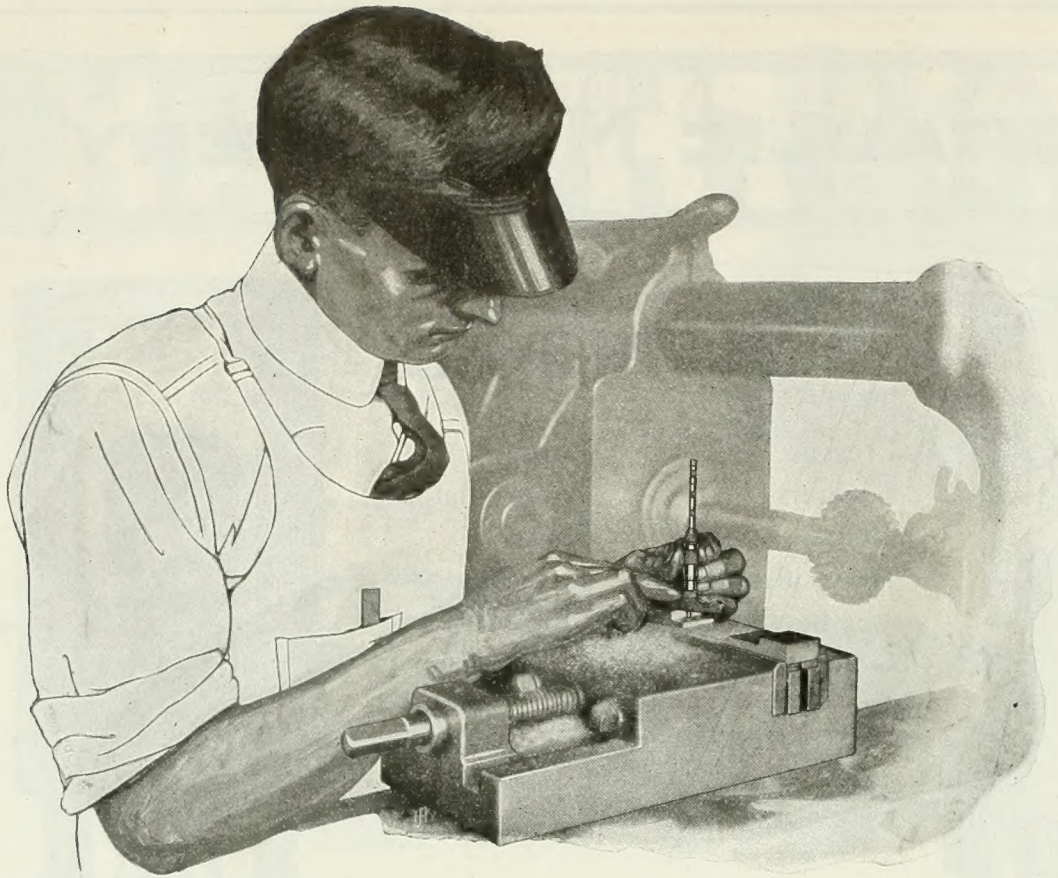
Old Colony Building, Chicago

Brown-Marx Building, Birmingham

"First Builders of Large Centrifugal Pumps in America."

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





# Starrett Tools

## Micrometer Depth-Gage

Here you are, Mr. Machinist,—when you want to make an accurate measurement of the distance from one surface to another below it—you can insure perfect accuracy by using a Starrett Micrometer Depth-Gage. It is as practical and precise as an ordinary micrometer is for measuring sizes.

It will measure the depth of holes, grooves, or irregular parts. It has a  $\frac{1}{2}$ " movement of the screw reading in thousandths and with two  $\frac{1}{2}$ " and one 1" standard collars to slip off or on, measurements through  $2\frac{1}{2}$ " can be obtained. The split nut is covered and protected by our patented graduated sleeve, which not only protects the nut from dirt

but provides a quick and accurate way of taking up the wear and adjusting the micrometer to insure correct reading. The Starrett micrometer adjustment is provided on this depth-gage, permitting accurate adjustment. The head and the point of the measuring rod are hardened against wear.

### PRICES:

No. 446A with  $2\frac{1}{4}$ " base, with case—\$5.00, without case \$4.50.

No. 446B with 4" base, with case—\$5.75, without case \$5.00.

This gage is also graduated in metric units.

Send for free catalog No. 203 describing 2100 styles and sizes of Starrett Tools and Hack Saws.

**The L. S. Starrett Co.,**

WORLD'S GREATEST TOOLMAKERS

New York

London

**Athol, Mass.**

Chicago

42-482

# Starrett Tools

*The Standard Instruments of Precision*



## Two Cuts at One Time

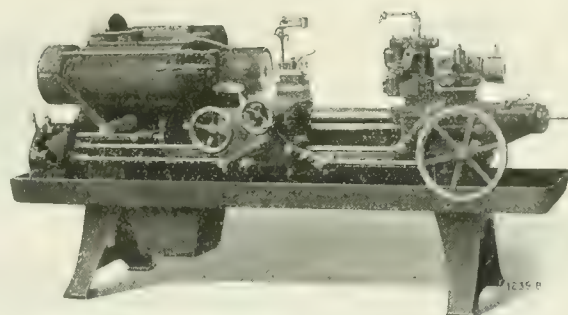
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

### Universal Hollow-Hexagon Turret Lathes

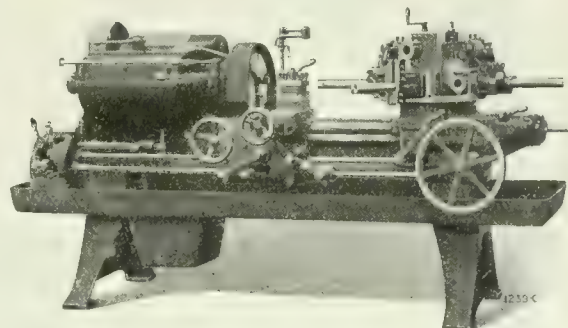
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

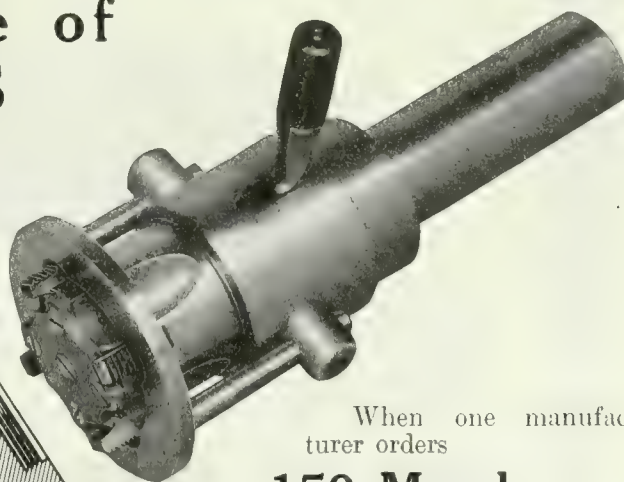
**THE WARNER & SWASEY CO., Cleveland, Ohio, U. S. A.**

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal.

## Threading the Base of LYDDITE SHELLS

Here is the Tool—Murchey Collapsing Tap with overhanging chasers—doing the work and doing it well.

For Lyddite Shells —  
Shrapnel Shells —  
French and  
Russian  
Shells.



When one manufacturer orders

### 150 Murchey Collapsing Taps

There must be a reason. There is a reason. It's just this—these taps are taking the place of higher-priced tools, and they are speeding up production with all the rigid accuracy and quality of work that is demanded in the output of shell work.

Write for details and catalog.

**MURCHEY MACHINE & TOOL COMPANY**

34 Porter St., Detroit, Michigan

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





Hex Head Cam



Headless Cam

MANUFACTURERS OF  
SUPERIOR DROP-FORGINGS

**P**ROGRESSIVE Superintendents know the tremendous economy of tool holder use, but many of them preferred to forego the economy and escape the annoyance of set screw troubles and breakage delays.

We were gratified recently at receiving an order for a full line of

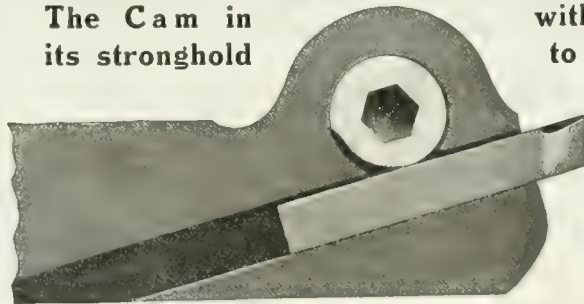
## Williams' "AGRIPPA" Tool Holders "THE HOLDERS THAT HOLD"

for Turning, Planing, Boring, Threading, Knurling, Cutting-off and Side Work from such a Superintendent and questioned him upon his change of heart.

He confessed

The Cam in  
its stronghold

with its back  
to the wall



had penetrated his blindfold, convincing him that cam fastenings are more serviceable than any other fastenings ever used in tool holders, because they can be made to grip tighter (the greater the pressure the tighter the lock) and because they cannot strip, upset, or "lose their heads." Hence long life to

## Williams' "AGRIPPA" Tool Holders "THE HOLDERS THAT HOLD"

**J. H. WILLIAMS & COMPANY**

43 Richards St.

Brooklyn, N.Y.

Western Office and Warehouse,  
40 So. Clinton St., Chicago

Exhibitors at Panama-Pacific Exposition,  
Block 18, Machinery Palace

YOUR CALL WILL PLEASE US

Write for new Catalogue—just out—showing a complete line of Drop-Forged Tools

*The advertiser would like to know where you saw his advertisement—tell him.*



# Principles of Laying—Off Cylindrical Intersections---I.

By J. W. Ross

*The more or less special nature of the work involved in the making of sheet metal piping has caused many manufacturers to avoid this class of work, with the result that when a job has to be handled, there is frequently considerable unnecessary loss incurred through errors in laying off material. The examples treated by the writer of this article should form a valuable reference to many manufacturers on ordinary as well as special occasions.*

THE perspective drawing in Fig. 1 illustrates the intersection of two cylinders of equal diameter. The method of obtaining the mitre line, which is essential to the development of the patterns, is shown in Fig. 2 and 3.

## Construction.

To construct this tee, measure off in Fig. 2, H G equal to  $2\frac{1}{2}$  inches. At right angles to this line, make H A and G F

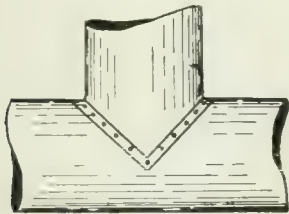


FIG. 1.

equal to the diameter of the cylinder, which is 1 inch. Draw the line A B E F parallel and equal to H G. Measure off A B and E F each equal to  $\frac{3}{4}$  inch, thus locating the diameter B E, of the intersecting pipe, which is equal to one inch. Raise the perpendiculars B C and E D equal to  $\frac{3}{4}$  inch each. Connect C to D, thus completing the elevation view of the "tee" as shown in Fig. 2. To delineate the mitre line, it will be necessary to construct an end elevation view, as shown by Fig. 3.

At a suitable distance from Fig. 2 draw in the centre line G<sup>1</sup> 7, Fig. 3, parallel to the line D E, Fig. 2. The points 7<sup>2</sup> G<sup>1</sup>, Fig. 3, are located by prolonging the lines A F and H G, Fig. 2. With centre X and radius X G<sup>1</sup>, Fig. 3, strike the circle 4<sup>2</sup> 7<sup>2</sup> 10<sup>2</sup> G<sup>2</sup>. Draw the line 4<sup>1</sup> 10<sup>1</sup>, Fig. 3, equal in length, and in line with C D, Fig. 2. Draw the lines 4<sup>1</sup> 4<sup>2</sup> and 10<sup>1</sup> 10<sup>2</sup>, Fig. 3, parallel to the centre line 7<sup>1</sup> G<sup>1</sup>. This completes the end elevation view. Project and describe—in a suitable position—the whole plan view, 1 4 7 10, above the cylinder elevation C B E D, Fig. 2. Divide this plan view into a suitable number of equal parts, as shown by the 12 divisions in Fig. 2. From these points draw projection lines—parallel to C B and D E—through the line A F. In Fig. 3 also draw a plan view in its correct relation to the cylin-

der and divide this into the same number of equal parts as was done in the case of Fig. 2. Project these points—parallel with the centre line 7<sup>1</sup> G<sup>1</sup>—to

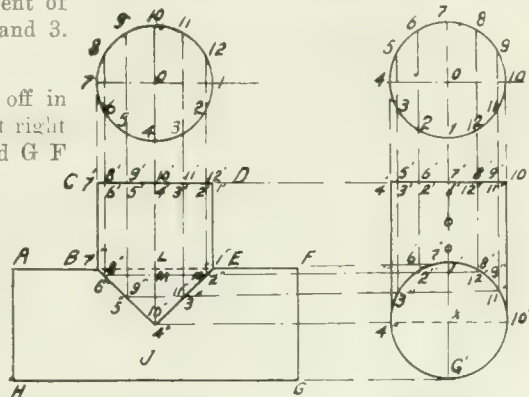


FIG. 2.

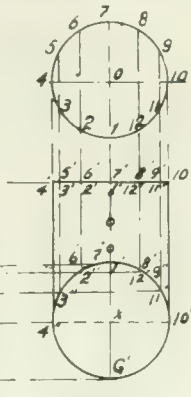


FIG. 3.

their intersection of the cylinder 4<sup>2</sup> 7<sup>2</sup> 10<sup>2</sup> G<sup>2</sup>. In Fig. 2 the plan view is numbered from 1 to 12. Similarly the intersecting points of the projection lines are numbered in relation to these numbered points in the plan view. Fig. 3 must also be numbered in relation to Fig. 2. As the view in Fig. 3 is shown by a quarter turn to that of Fig. 2, therefore 1 as shown in Fig. 2 of the plan view will be shown by 1 on the centre line 7<sup>1</sup> G<sup>1</sup>, Fig. 3. The other points being numbered accordingly and in relation to both Figs. 2 and 3. The intersecting points are also numbered in respect to their positions.

The points 4<sup>2</sup> and 10<sup>2</sup>, Fig. 3, are pro-

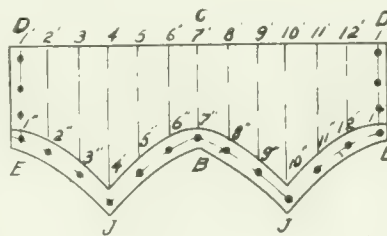


FIG. 4.

jected over to Fig. 2 by drawing a line parallel to the line H G. Where this projection line 4<sup>2</sup> 10<sup>2</sup>, Fig. 2, intersects the vertical projection line 4<sup>1</sup> 4<sup>2</sup>, 10<sup>1</sup> 10<sup>2</sup>, Fig. 2, this locates the extreme point of the mitre line as shown by the letter J and

the numbers 4<sup>2</sup> 10<sup>2</sup>, Fig. 2. Also by drawing lines parallel to J X project over the points 3<sup>2</sup> 5<sup>2</sup> 6<sup>2</sup> 7<sup>2</sup> etc., from Fig. 3 to their intersection of their similarly numbered vertical projection lines in Fig. 2, thus locating the points 7<sup>2</sup> 8<sup>2</sup> 6<sup>2</sup> etc., Fig. 2. Connect all these points, thus defining the mitre line. Now having obtained the mitre line, the two intersecting pipes may be developed. The straight line D C D, Fig. 4, is made equal in length to the circumference of the cylinder of which D C, Fig. 2, is the diameter. C D, Fig. 2, equals 1 inch, therefore the stretched-out circumference D C D will equal 1 inch multiplied 3.14 = 3.14 inches, which is slightly over  $3\frac{1}{8}$  inches.

Divide D C D, Fig. 4, into the same number of equal parts as in the plan views, Figs. 2 and 3, which is 12. Number these points in consecutive order, with the idea in mind of having the vertical seam to come on the line 1<sup>1</sup> 1<sup>2</sup>, Figs. 2 and 3. Project lines downward from these points at right angles to D C D, Fig. 4 with the trammels or dividers set at a length equal to 1<sup>1</sup> 1<sup>2</sup>, Fig. 3, transfer over to 1<sup>1</sup> 1<sup>2</sup>, Fig. 4, this line being the vertical rivet line for this pipe, therefore this distance will be marked off on the extreme division points of the line D C D Fig. 4, as 1<sup>1</sup>, 1<sup>2</sup> and 1<sup>1</sup> 1<sup>2</sup>. Reset the dividers to the distance 2<sup>1</sup> 2<sup>2</sup>, 6<sup>1</sup> 6<sup>2</sup>, 8<sup>1</sup> 8<sup>2</sup>, 12<sup>1</sup> 12<sup>2</sup> Fig. 3 which are all

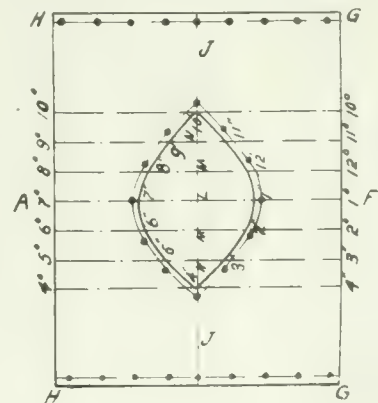


FIG. 5.

equal in this case, and transfer over to their proper positions in Fig. 4.

Again reset the dividers to the equal distances 3<sup>1</sup> 3<sup>2</sup>, 5<sup>1</sup> 5<sup>2</sup>, 9<sup>1</sup> 9<sup>2</sup>, 11<sup>1</sup> 11<sup>2</sup>, and similarly transfer these over to their positions in Fig. 4 as denoted by

\*Note: The reference letters and numerals in the text, i.e., G<sup>2</sup>, 7<sup>2</sup>, etc., correspond with those of the illustrations indicated as G<sup>2</sup>, 7<sup>2</sup>, etc.



their respective numbers. A fair curve drawn through these located points will denote the mitre line. This mitre line is the flange line for light riveted plate.

The riveted line and laps being afterwards added according to the thickness of the plate and the size of the rivets.

If this tee is made of tin, to be soldered, then the mitre line will be the junction line of the two pipes, soldering

corresponding rivet holes in Fig. 5. It is extremely difficult to have these holes come fair, after rolling up and fitting together of the pipes, due to errors of workmanship in flanging and rolling. Generally one or the other is left blank regarding holes. The pieces being fitted together, marked off and then drilled or punched as the case may be according to the facilities of the shop. The

The plan view of the small cylinder is drawn above C D and divided into any number of equal spaces. It is desirable in order to facilitate the drawing of the construction lines and the developments, that the numbers of divisions be divisible by four, so that four quarters of the cylinder will be located with two of the points on the centre line vertically and two horizontally as shown in the plan views, Figs. 7 and 8. The number chosen here is 12, the four quarters being then each divided into three equal spaces. Number the points as shown. Project all points so numbered through A F and parallel to the centre line 10 J.

Project the axial line K K Fig. 7 to K' Fig. 8. With radius equal to K F Fig. 7, and centre K' Fig. 8, draw the circle in Fig. 8 representing the end view of the cylinder A F G H. Fig. 7. Draw the centre line 7 K' P Fig. 8 parallel to 10, J Fig. 7. Draw the line 4' 10' Fig. 8 in line with and equal to CD Fig. 7. The outline of the vertical cylinder is completed by connecting 4' to 4' and 10' to 10', these lines being parallel to the centre line 7 K'. Draw the plan view 1, 4, 7, 10, and number in relation to Fig. 7, keeping in mind that the plan view in Fig. 8 is turned one-quarter round to correspond with end view Fig. 8. Project all the points to the section of the cylinder J 7' J Fig. 8. Project these numbered points as 4', 5', 6' etc. Fig. 8 by straight and parallel lines till they intersect similarly numbered vertical lines in Fig. 7. A suitable curve drawn through these points in Fig. 7, defines the mitre line. D C D Fig. 9 equals 3 1/4 inches, this being the calculated stretchout of the dia. C D Fig. 7. Divide D C D into 12 equal spaces numbered accordingly. Draw in the perpendiculars equal in length to the perpendiculars of C B J E D Fig. 7. A curve drawn

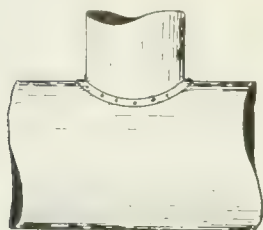


FIG. 6.

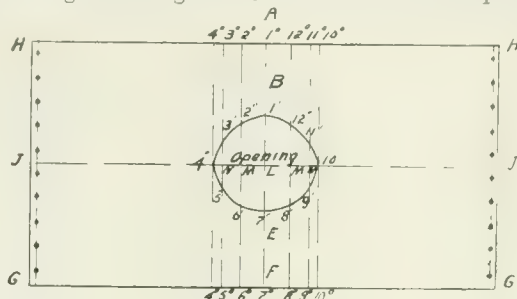


FIG. 10.

allowances to be added as required. Fig. 4 shows the completed templet for a riveted connection. To develop the cylinder H. A. B. E. F. G, Fig. 2 calculate the stretchout of which F G is the diameter. F G equals 1 inch, the stretchout will therefore equal  $1 \times 3.14$  equal to a little more than 3 1/8 inches.

Measure off G G Fig. 5 equal to 3 1/8 inches. Draw H H parallel and equal to G G and the distance apart H G equal to the length of the pipe which is 2 1/2 inches as measured by the length A F or H G, Fig. 2. As the pipe A F G H, Fig. 2 is a right cylinder, so will the outline H H G G be a perfect rectangle, that is to say its opposite sides being parallel and its angles right angles. This plate may be squared up by the process as explained in an earlier article of this series.

Bisect G G at F, Fig. 5, erect the perpendicular F A. Measure along the curve the distance 7' 6". Fig. 3 transfer this over to 7' 6" Fig. 5. Again take the length 6' 5" along the curve—Fig. 3 and transfer over to Fig. 5 as 6' 5". Also transfer the distance 5' 4" Fig. 3 to 5' 4" Fig. 5. Similarly make the distances 7' 8", 8' 9", 9' 10". Fig. 5 equal, to their distances as denoted by their respective numbers in Fig. 3. Erect perpendiculars from these points to the line H H and number as shown. Bisect H G at J and draw in the line J J, Fig. 5. Set the dividers to the distance L I', Fig. 2 and transfer over to L I' Fig. 5. Reset the dividers to M I' Fig. 2 and again transfer to Fig. 5 as M I'. Make N I' Fig. 5 equal to N I' Fig. 2. Similarly transfer over the remaining distances in Fig. 2 to their corresponding numbers in Fig. 3. An even curve drawn through these located points, will define the mitre line or the opening in this pipe. The rivet lines and hole centers are drawn in according to requirements. Fig. 4 shows the rivet holes to connect to the

general practice for light work is to put the holes in the vertical piece before rolling, then fit it to the horizontal pipe, afterwards drilling the holes through. In heavy work the holes are put in the pipe with the opening also before rolling, and the vertical piece is then fitted on, marked off and then punched. Fig. 5 shows the completed templet for the horizontal pipe shown in the perspective view Fig. 1.

#### Intersections of Unequal Diameters.

It will be observed that the mitre line is slightly different in the perspective view Fig. 6 than was in the preceding problem.

The side and end elevations are shown in Figs. 7 and 8 respectively. Measure off H G Fig. 7, 2 1/2 inches long. H A is drawn at right angles to H G and is equal in length to the diameter of the large cylinder which is 1 1/2 inches. Draw A

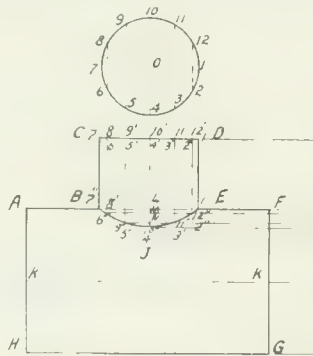


FIG. 7

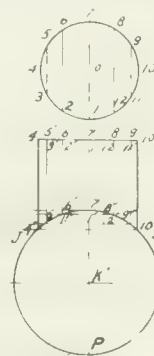


FIG. 8

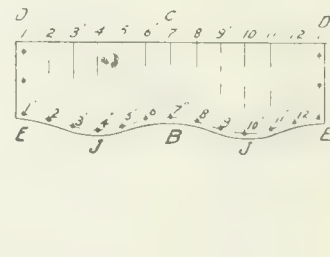


FIG. 9

F parallel and equal in length to the line H G. Bisect A F at L and raise the perpendicular 10, L, J. Measure L B and L E each equal to 1/2 inch, thus making the diameter B E of the small cylinder equal to 1 inch. Parallel to 10, J, draw the perpendiculars C B and D E each 3/4 inch in length, connect C to D, completing the side elevation outline.

through these located points will define the mitre line or flange line. The rivet line and lap, or seaming allowances being added accordingly. It will be noticed that the contour of the mitre line of this templet is slightly different to that of the templet Fig. 3 for the equal diameter cylinder intersections.

Measure off G, F, G, Fig. 10 equal to



the stretchout of the cylinder J, 7', J, P, Fig. 8 of which P 7' Fig. 8 or F G Fig. 7 is the diameter. This equals  $1\frac{1}{2}$  inches multiplied by 3.14 equals 4.71 or nearly  $4\frac{3}{4}$  inches. Erect the perpendiculars G H, G H, Fig. 10 at right angles to G G, and equal in length to H G Fig. 7. Connect H to H which will be parallel and equal in length to G G.

Bisect G G at F and erect the perpendicular F, A. Measure 7°, 6°, 6°, 5° 5', 4°, etc., Fig. 10 equal to the length measured along the curve of 7°, 6°, 6°, 5°, 5°, 4°, etc., Fig. 8. Erect vertical lines on these points as 4°, 4°, 5°, 3°, 6°, 2°, etc., Fig. 10. Bisect H G at J and drawn in the line J J.

Mark the intersection of line J J with line 1° 7°, with the letter L. Locate M and N in a similar manner. Now lay off the distances L, 1°, L, 7°, M, 12°, M, 8°, etc., Fig. 7 in their respective positions in Fig. 10. Draw in the curve defining the opening Fig. 10. Draw in the rivet line and space off the rivets. Space off the rivets at H G and add on the laps. This completes the templet.

#### Re-enforced Tee.

The perspective view Fig. 11 illustrates a tee pipe re-enforced by a shoulder collar, to resist vibratory strains, etc. Fig. 12 shows the side elevation, while the end elevation is shown by Fig. 13. To construct these views, measure off C D Fig. 12 equal to 3 inches, and A C and D B equal to the diameter of the cylinder—drawn at right angles to C D, and equal to 1 inch in length. Connect A B which is parallel to C D. Bisect A B at L and draw the perpendicular 10, J. Measure of L, 10', equal to 1 inch. At right angles to this line, through the point 10', measure off 10', 7', and 10', 1', each equal to  $\frac{1}{2}$  inch, making the diameter 7' 1' of the vertical cylinder equal to 1 inch. Draw the lines 7' R and 1' R parallel to the centre line 10, J. Mark R, 1°, R, 1°, R, 7° and R, 7° each equal to  $\frac{1}{2}$  inch. Connect the point 1°, 1' and 7°, 7°. With centre O and radius equal to 4', 7', construct the plan view 1, 4, 7, 10, as seen through E F. Divide into 12 equal spaces, number and project the points down through E F. Number these also in relation to their position. Now construct the end elevation, Fig. 13. Bisect B D at K Fig. 12. Draw the line K Fig. 12 to K' Fig. 13 parallel to A B and C D Fig. 12. With K' Fig. 13 as centre and radius K B or K D Fig. 12, describe the circle P, 4°, 1°, 10°. Draw the centre line K', 7, Fig. 13 parallel to the centre line 10, J, Fig. 12. Project the line E F Fig. 12 over to 4', 7', 10' Fig. 13. Draw 4', 4', and 10' 10' parallel to the centre line K', 7, tangent to the circle 4°, 1°, 10°, P, locating the points 4° and 10° on the line K K'. With centre O Fig. 13 describe circle 1, 4, 7, 10, with

a diameter equal to the diameter 4' 10' of vertical cylinder. Divide this plan view into the same number of equal parts as the plan view Fig. 12. As this

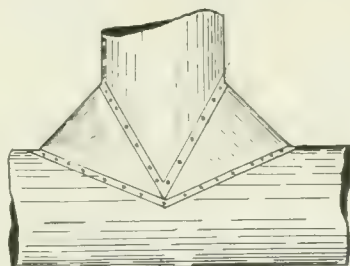


FIG. 11.

view Fig. 13 shows a quarter turn of the view in Fig. 12, the point 1 will commence on the centre line 7 K', the remaining points being numbered in their consecutive order in relation to the posi-

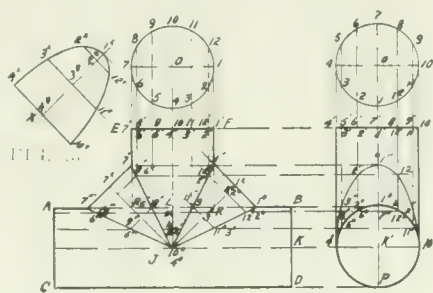


FIG. 12.

FIG. 13.

tion of point 1. Project all these points down to the circle P, 4°, 1°, 10°. Number their intersection accordingly. Project the points 4°, 10°, Fig. 13 over to their vertical projection in Fig. 12 thus locat-

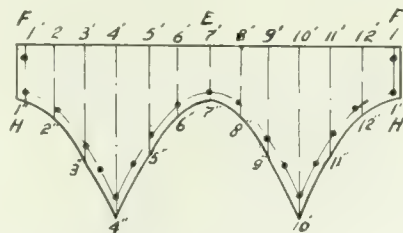


FIG. 14.

ing the points 10°, 4° at J, Fig. 12. Connect point J by straight lines with the points J, 1°, J, 1°, and J, 7°, J, 7°. These lines will define the mitre lines of the several pieces to be developed. From

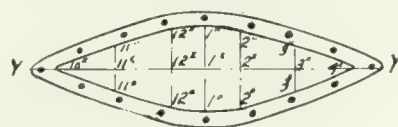


FIG. 16.

the points 1°, 2°, 3°, 4°, 5°, etc., in Fig. 13, project over to the mitre lines 4° 7°, and 4° 1°, Fig. 12, locating points 1°, 2°, 3°, 4°, etc. Note where the vertical projectors intersect the mitre line 7°, 10°, and 10°, 1°. Number these points in respect to their vertical projectors, connect the

points 2° to 2°, 3° to 3°, 6° to 6°, 5° to 5°, these lines being parallel to the lines 1°, 1° and 7°, 7°. These points may be projected over to Fig. 13 to show the side elevation of the collar, but this is not essential for the development of any of the patterns. In fact the whole of the side elevation view need not have been drawn.

In this case it was done to demonstrate the method of solving the problem. A half section view drawn in the diameter B D, would have given all the information required. If there is any doubt in the minds of the readers regarding the construction it would be better to draw both views thus being enabled to grasp the subject more thoroughly. Further advancement in the practice of these problems, would necessitate more or less construction lines according to the class and character of the work. Fig. 14 shows the templet for the vertical piece in Fig. 12.

Calculate the stretchout of E F Fig. 12, and lay this out on the straight line F E F, Fig. 14. This length equals  $1 \times 3.14$  or nearly  $3\frac{1}{4}$  inches. Divide F E F into 12 equal divisions. Through these points draw perpendiculars and number them according to the divisions and numbers of the plan view in Fig. 12. Take the distance 1', 1', and 7', 7', and transfer over to 1', 1' and 7', 7', Fig. 14. Set the dividers to the distances 2', 2', 3', 3', 4', 4', etc., Fig. 12 and transfer all these distances over to their respective locations in Fig. 14. Draw in an even curve through these points thus defining the mitre line. The connecting flanges being on the collars or gores, the rivet line instead of being added on to the mitre line, Fig. 14, will have to be drawn back towards the line F E F, to a distance suitable so that the mitre line will define the lap. Add the laps for the vertical seams at F H, F H. Then Fig. 14 will show the complete templet for vertical piece as shown in Fig. 12.

To develop the horizontal course Fig. 12, calculate the stretchout of the cylinder of which B D is the diameter. Measure this stretchout which equals  $3\frac{1}{4}$  inches along the line C A C Fig. 17. Draw D B D parallel and equal to C A C, and make D C, the distance apart equal to the length of the cylinder D C Fig. 12. The line D C is drawn at right angles to C A C. Bisect C A C to locate A. Raise the perpendicular A B to the line D B D. Measure off the distances 7 to 6, 6 to 5 and 5 to 4, etc., Fig. 17, equal to the distances 7° to 6°, 6° to 5°, 5° to 4°, etc., Fig. 13 measured along the curve. Erect perpendiculars through these points, parallel to the line A B. Now take the distances L, 1°, and L, 7°, Fig. 12, transfer this over to L, 1°, and L, 7°, Fig. 17. Similarly transfer the distances M, 6°, M, 2°,



N, 5<sup>1</sup>, N 3<sup>0</sup>, etc., Fig. 12 over to their corresponding numbers in Fig. 17. Draw in the curve to define the mitre line which is also the opening. Rivet line being afterwards drawn in according to the laps of the gore. To develop the gore it is necessary to show an end view of the centre gore line 1<sup>x</sup> 4<sup>0</sup>, Fig. 12.

To construct this section, draw the line X1<sup>x</sup>, Fig. 15 parallel to the line 4<sup>0</sup> 1<sup>x</sup> Fig. 12. Transfer the distances 1<sup>x</sup>, 2<sup>x</sup>, 2<sup>x</sup>, 3<sup>x</sup>, 3<sup>x</sup>, 4<sup>0</sup>. Fig. 12 to the distances 1<sup>x</sup>, 2<sup>x</sup>, 2<sup>x</sup>, 3<sup>x</sup>, 3<sup>x</sup>, 4<sup>0</sup>. Fig. 15. It will be observed that the distance through the points 2<sup>x</sup>, 12<sup>x</sup>, is equal to the distance through the points 2<sup>1</sup> 12<sup>1</sup>, which is shown in the plan view 2 to 12 measured along the projector, Fig. 12. As both the intersecting cylinders are equal, the distance 12<sup>0</sup>, 2<sup>0</sup>, as shown by 2<sup>0</sup>, 12<sup>0</sup> in Fig. 13 is equal to 2, 12, Fig. 12. Take this distance and place half at each side of the point 2<sup>x</sup> along the line drawn at right angles to X1<sup>x</sup>, thus locating the points 2<sup>x</sup> and 12<sup>x</sup> Fig. 15. Make 3<sup>x</sup> 3<sup>x</sup> 11<sup>x</sup> Fig. 15 equal to the straight line distance 3, 11, in plan view Fig. 12, thus defining the section distance through the points 3<sup>x</sup>, 11<sup>x</sup>, and 3<sup>0</sup>, 11<sup>0</sup> Fig. 12. Similarly transfer the distance 4, 0, 10, Fig. 12 to 4<sup>x</sup>, Y<sup>x</sup>, 10<sup>x</sup>, Fig. 15. A fair curve drawn through these points represents the section shown through the straight line 4<sup>0</sup> 1<sup>x</sup> in Fig. 12. The stretchout of this curve is laid out on the line Y Y Fig. 16. It is divided up into the same distances as on the curve Fig. 15. Draw lines at right angles through these points.

Take the distances 1<sup>x</sup>, 1<sup>2</sup>, and 1<sup>x</sup>, 1<sup>0</sup> Fig. 12, and place this distance to locate the points 1<sup>2</sup> and 1<sup>0</sup> on the line 1<sup>2</sup>, 1<sup>x</sup>, 1<sup>0</sup> Fig. 16. Again transfer the distances 2<sup>x</sup>, 2<sup>2</sup>, 12<sup>2</sup>, 2<sup>x</sup>, 2<sup>0</sup>, and 2<sup>x</sup>, 12<sup>0</sup>, Fig. 12 over to their similarly numbered positions in Fig. 16. Transfer the remaining measurements over to Fig. 16. Through these points draw a fair curve. This curve will be the mitre line and in this case also the flange line. Add on the rivet line and laps. Fig. 16 shows the complete templet for either of the two gores.

### BOASTFULNESS.

THE art of advertising or of making known to those concerned the merits of what one has to sell varies in method according to the public to which the advertisements are addressed. When advertising pills it may do to state that they are worth a guinea a box, although sold at 27 cents, and in spite of the fact that everyone who reads the advertisement knows the statement to be untrue. The object of the advertiser is not to deceive the buyer as to the value of the pills, but to ensure, by the constant repetition of their name, in conjunction with a striking phrase that when pills are required his own make will natur-

ally come to mind and be purchased. Advertising of this kind is very popular, and undoubtedly has a certain hypnotic value when selling anything whatever, but is not to be recommended when the intention of the advertiser is to instill confidence in the productions and in his advice as an expert.

The buyer of a machine tool depends to some extent on makers' advertisements for information, and such being the case he has a right to expect that they shall be reliable and free from boastfulness. Boastfulness is easily detected and destroys the confidence of the buyer, thus defeating its own ends. Examples of this kind of advertising can be seen in most of our technical journals. One maker advertises "Perfection in Design," which we know has not yet been attained anywhere. Another that the teeth of his milling cutters being large are therefore exceptionally strong—which does not by any means

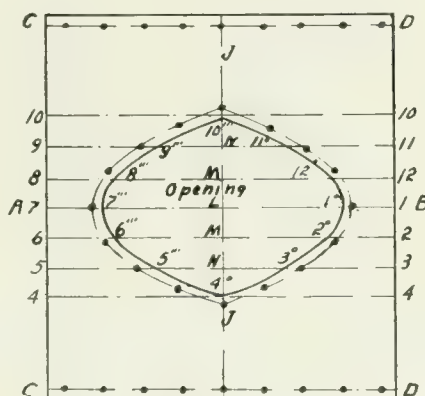


FIG. 17.

follow. The way to make teeth strong is to make them thick, which was not done in the case in question, as the illustration accompanying the advertisement clearly showed.

A third illustrates an article 28 feet in diameter, weighing 90,000 lbs., stated to be "True to one-thousandth of an inch," which, if a statement of fact, can only be so under very restricted conditions of position and temperature, and is probably quite necessary.

Such statements convey an impression of boastfulness in style, which is only too often accompanied by inferiority in matter.

Bold and striking statements are by no means inadmissible in engineering advertisements, providing they are true and capable of proof or of demonstration, but it is nevertheless wise that they should contain a little less rather than a little more than the truth.—*Herbert's Monthly*.

Hamilton, Ont.—The Hamilton Machine Gun fund now totals \$105,000 and contributions continue to come in steadily.

### TUNGSTEN.

TUNGSTEN is one of the many raw materials, the value of which has been greatly enhanced as a result of the war. It is a most important ingredient of high-speed steel, and the increased demand for that product itself, rendered necessary by shell manufacture, would be sufficient to cause a large advance in price. While most of the tungsten hitherto used in Britain has had to be imported, it is good to know that this metal is now being prepared from raw material obtained in the County of Cornwall, England.

Although most of the tungsten produced by different countries is used in steel making, considerable quantities are required in the manufacture of incandescent electric lamps. The material as received by the lamp makers is in a powdered state, and the Society of Engineers (London) recently had an opportunity of seeing it being made into the thread-like wire so familiar to all users of electricity. The tungsten powder is compressed into small bars by hydraulic pressure, and is afterwards purified at a very high temperature by a hydrogen flame.

After being treated with electricity to increase the solidity, it is gradually swaged down at a high heat, till it is small enough to be drawn through dies in the ordinary wire drawing manner.

### PROPOSED MUNITIONS FACTORY FOR "AMATEURS."

MUCH interest is being taken in North-East Coast shipyards and engine works in the proposed establishment for the making of munitions of war by technical and unskilled part-time workers.

The proposal is that a munitions factory should be established in Newcastle, the capital to be found by the Government, as was the case in connection with the Leeds munitions factory. The promoters aim at a small factory as a beginning, which should have twenty lathes, and would cost about \$25,000. There will be no difficulty, it is understood, in obtaining lathes, and suitable buildings can be secured. The labor will be provided by part-time men of skilled occupations, such as draughtsmen and others who have served an apprenticeship to technical trades, while quite a number of commercial men will be available who are fair mechanics. A few permanent officials will of course be required.

The proposal seems eminently practicable, and, since the need exists for taking advantage of both large and small offers of assistance in munition-making, it is likely that the Government will make use in some form of the proposal.



# PRODUCTION METHODS AND DEVICES

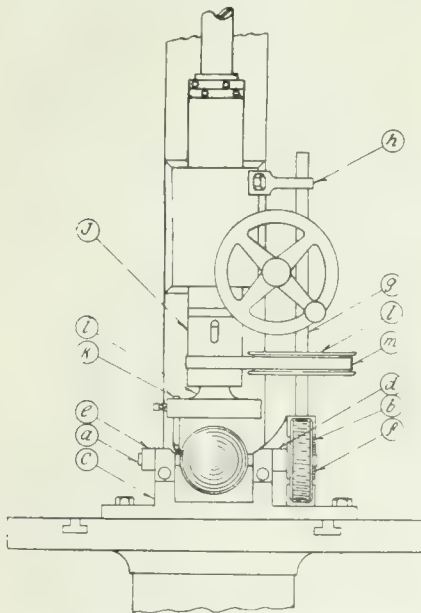
A Department for the Interchange and Distribution of Shop and Office Data  
and Ideas Evolved from Actual Practical Application and Experience

## BALL TURNING ON A DRILL PRESS

By J. W. Innes.

THE accompanying sketch illustrates the method adopted in a shop some time ago for the manufacture of a quantity of small brass balls used in the construction of a certain make of check valve. While no high degree of accuracy was required the balls were necessary to be approximately round. To produce these in fairly large numbers was a problem that the foreman had to solve. There being no suitable device in the shop with which to accomplish the required result, the fixture here shown was designed and used with very much satisfaction, both in quantity and quality of production.

The finished balls were of 2 in. dia. A small hole  $\frac{1}{2}$  in. dia. was drilled through the centre of the rough casting. It was then driven on the arbor (a). On one end of this arbor was secured the worm gear (b). The arbor was then placed in the jig (c) (which was secured to the drill table with the ball in a central position) and held in position by the collars (d) and (e). The worm (f) was secured to the shaft (g) which passed through and revolved in the bearings of the jig (c) and bracket (h). The shank of the tool-holder (l) was

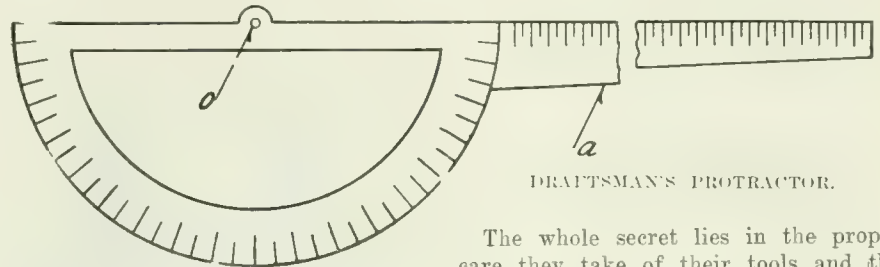


BALL TURNING ON A DRILL PRESS.

turned to fit the drill spindle (j) and the tool (k) was made to suit the work in hand and secured by the set screw shown. Secured to the shaft (g) was the flanged pulley (l), which was driven from the drill spindle by the belt (m).

The operation was as follows: After jig and tool-holder were properly set and secured, the drill spindle was lowered until the tool came to the proper position. The spindle then being secured in this position, the action of the mechanism caused the ball and ar-

In some cases the greatest limits of accuracy are required in the production of threaded parts and it is often remarked by users of stocks and dies, "How is it that I cannot cut so accurate and smooth threads as are on some of the fittings or bolts I have just purchased?"



DRAUGHTSMAN'S PROTRACTOR.

bor to revolve and thereby remove the metal.

After removing the ball from the arbor, the hole in the centre was closed, the construction of the valve preventing the plug from coming in contact with the valve seat.

The work produced from this fixture was highly satisfactory and well repaid the expense of the construction.



## DRAUGHTSMAN'S PROTRACTOR.

By J. Garth.

THE sketch herewith shows the design of a protractor which extends the usefulness of those ordinarily seen on the draughtsman's table. The feature of this design is the extended arm (a) and the small centre hole (o). By means of this small hole a fine point can be inserted through the protractor and into the intersection of the two lines which form the required angle. By revolving the arm (A) about the centre (O) any desired angle is readily obtained.



## CARE OF THREADING DIES AND PIPE CUTTING TOOLS.

By P. W. Blair.

OWING to the universal use of dies for the cutting of screw threads on pipes and rods they should receive far more and better attention than is commonly accorded them.

The proper care of the dies and lubrication of same when in use is one of the greatest factors of economy that has to do with their use, and the cutting of screw threads has become one of the most important parts of nearly every line of manufacture of metal products.

The whole secret lies in the proper care they take of their tools and the lubricant used. As an illustration, a screw thread may be satisfactory if the parts merely have spiral marks which can be forced into a tapped hole and once in place it is out of sight and may never be discovered, consequently in some instances almost any kind of a thread will pass.

There are, of course, all sorts and conditions, but it seldom requires as much time to produce a perfect thread as it does the other kind, and the good thread can be produced with far less wear and tear on the tools.

If a man becomes sick he usually calls a physician and has his trouble diagnosed and suitable remedies applied. He rarely ever applies the same methods to his business. If a tool goes wrong and does not operate satisfactorily he does not spend much time trying to discover the cause of the trouble. If the trouble cannot be removed by the first application of his "remedies," the tool in many cases is condemned as being no good anyway, and he may also have something to say to the maker of such a tool.

In applying a lubricant for the cutting of pipe, bolt and other screw threads, similar results may be arrived at. Some users seem to think that any kind of a lubricant can be used; consequently an oil of some kind is used but seldom with proper regard, if any, as to whether the oil is suitable for the purpose. One of the most desirable features of screw cutting is to obtain the greatest quantity and quality of the work with the least wear and tear upon the dies.

It does not follow that because you have been using a poor grade of oil with fairly good results, that the same will be obtained when a new shipment of pipes or rods requires threading. The quality of the stock may vary to such



an extent that a different grade of lubricant is almost necessary.

Many users of thread cutting dies may still maintain that a tool that will cut a good thread with one grade of oil should give satisfaction used with any oil. Not only should suitable lubricants be used for various grades of metals but also in the cutting of different metals.

Many large manufacturers carry quite a number of different oils and lubricants, and are still experimenting to obtain better results.

All stocks and dies when not in use should be kept in a suitable place and thoroughly cleaned of foreign substances, so that when they are again required they shall be in good condition.



### SIMPLICITY IN TOOL DESIGN.

SIMPLICITY in tool design may sometimes be more apparent than real, and elaboration in the right direction often results in real economies. Most people familiar with the principles of tool design realize this, but too often one sees designs which are the outcome of a short-sighted view. As an instance, we may consider the machining of a large bevel gear, such as is used in motor car differentials. This would be made from a steel stamping, and two variant methods of machining on automatic turning machines are commonly seen, one bad, and the other good.

In the first method, the large bevel face is attacked with a roughing cutter in the form of a broad serrated flat blade, which is followed by a similar finishing cutter not serrated. This looks "simple" and turns out the work rapidly for a short time, but the hard scale soon plays havoc with the serrated roughing tool, and when it requires grinding it has to be returned to the tool room, being too difficult a job for the operator to tackle.

In the second method, one sees the bevel face traversed by a single point tool carried on a slide mounted on the



FIG. 1.  
SIMPLICITY IN TOOL DESIGN.

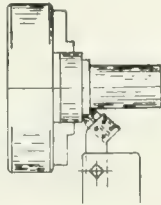
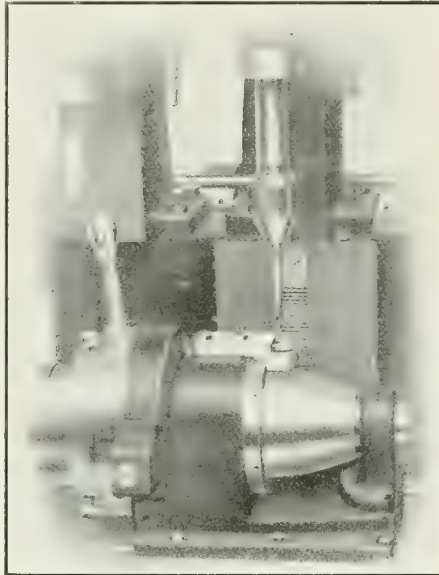


FIG. 2.

cross slide, and actuated by a suitable former cam. The actual cutter is only a small piece of rectangular high-speed steel, which can be quickly made and re-ground by the operator himself. The initial cost of the latter arrangement is certainly the greater, but there is no question as to which is ultimately the better.

On another job, one finds two shoulders close together that have been faced from the cross slide. A bad method employs a facing tool with a step ground on it, the same width as the distance between the shoulders (Fig. 1). This again is "simple," and works well until one of the cutting points gives out, when again re-grinding is a tool-room job.

The better method (Fig. 2) utilizes a small tool holder carried in the cross slide tool block, the cutting tools being two small pieces of steel which can be set the correct distance apart. These, again, are easy to re-grind, and cheap to



DRILL JIG FOR SHRAPNEL SHELLS.

replace, although the initial cost is the greater of the two.

Many similar instances could be cited, but enough has been said to show that the initial cost is not the last cost, and the best designs utilize cutting tools in the simplest possible form, which can be re-ground and, if possible, made by the operator himself.



### DRILL JIG FOR SHRAPNEL SHELLS.

THE noses of the larger shrapnel shells are made separate from the bodies, and are held in place by a number of pins and screws. When the charge in the base is exploded, the screws are sheared and the head blows off, allowing the bullets to scatter.

On the 60-pounder shell there are eight screws and eight pins, the holes for which are drilled and tapped with the head and body assembled. The illustration shows a type of jig used in conjunction with a ball-bearing drill which has given much satisfaction wherever employed. The jig is semi-automatic in its action, and consists of a casting bored to receive a sleeve in which the shell is

clamped, while at the right-hand end a small bracket and locating plug support the nose.

When the operator pulls the handle towards him, the locking bolt is withdrawn, and on pushing it back, the sleeve carrying the shell rotates until the bolt drops in again. This jig is exceedingly rapid in action, and the whole arrangement very compact.—Herbert's Monthly.



### GUNS v. TORPEDOES.

BEFORE the war started the gun was generally looked upon as the most effective weapon, but the success of submarines in the early stages of the war probably altered the balance of opinion. In making a comparison, it must be remembered that recent naval warfare has favored the use of the torpedo and given little chance to the gun. If the torpedo is to be a success at all it must be used at short ranges, and, generally speaking, the submarine is the only vessel which renders this possible.

In naval battles fought before the advent of the submarine the percentage of hits with torpedoes was notoriously small. On ships stationary it was somewhat more successful, but very few vessels in motion were destroyed by torpedo attack. The destructive power of the torpedo, should it get home, is unquestionable, but its small speed compared with that of a shell is its great drawback.

The maximum velocity of a torpedo is not more than 45 knots, and this is reduced as the distance covered increases. Even the modern torpedo takes nearly three minutes to cover two miles, and in this time the relative speeds and courses of the passing vessels may be entirely altered, and large surface vessels would not approach one another so closely unless gun-fire had already done its work. It is only when used in a submarine that the torpedo is effective, and only then when the presence of the underwater vessel is undetected.

In the few naval engagements that have been fought in the North Sea, where it would be reasonable to assume that submarines would be valuable, their success has been nil, and the inference is that high speeds and good manoeuvring are all-sufficient to destroy the aim of the torpedo officer. Taking vessels destroyed during the war, slightly more have been destroyed by gun-fire than by torpedoes from submarines. The few isolated cases where surface craft have successfully launched torpedoes are quite special and cannot be taken as precedents. It can safely be predicted that when the big ship actions come, the victory will be obtained by gun-fire and gun-fire alone, and it is to these actions that the British Navy looks forward with every confidence—L.J.C.



# EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

## HEALTH HAZARDS AND SAFETY PRECAUTIONS.

By J. M. W.

A STUDY of recent developments of applied science show that the first applications of many new inventions have been characterized by great indifference to their effect on operators. The complete success of oxy-acetylene welding and similar processes has been accompanied if not made possible by suitable precautions to safeguard the health and comfort of the men engaged on the work.

### Oxy-Acetylene Welding.

The adoption of oxy-acetylene welding has been so rapid, and the different branches of industry which offered suitable opportunities for its use so numerous, that the trade obtained a wide field of activity before manufacturers obtained a true appreciation of its attendant hazards.

The type of apparatus varies considerably with the nature of the work. Small portable repair outfits are noteworthy principally because the gases are contained under pressure in storage cylinders. Fixed plants such as are used in shops specializing on welding consist of an acetylene gas generator which supplies this gas under a suitable pressure. The oxygen is usually obtained in cylinders from firms which specialize in the manufacture of this gas.

When using both gases from cylinders the cylinders are fitted with valves so as to maintain the supply of gases at the proper pressure. These valves are automatic in action and reduce to a minimum the risk and attention required from the operator.

Portable generators are not desirable on account of the necessity when traveling, for removing the water and carbide. Any carelessness in this respect may allow sufficient quantities of carbide to come in contact with damp or moisture and generate enough gas to cause a severe explosion. Additional care and common sense must be exercised when handling generator plants as compared with storage cylinders.

### Cleaning Out the Gas Generator.

The use of an open flame light when cleaning out a generator is a fruitful source of accident. When starting to clean a generator, the gas may be released through a suitable exit until the pressure gauge falls to zero. But the fact that the gauge is at zero does not

mean that there is no gas inside. It means that the gas which is inside is at zero pressure, and unless that remaining volume of gas has been displaced or allowed to pass out, so that the space which it occupied is filled with air, it will still be in the apparatus waiting for the first opportunity to ignite. When the generator has been safely opened, any remaining water which has not been completely drained off should be carefully mopped up and all traces of dampness removed before cleaning out the carbide. Especially is this the case where the construction of the generator is such that the carbide may cake and remain on the walls, as lumps of this caked carbide may be capable of generating a dangerous quantity of gas should they come in contact with unexpected moisture.

These considerations will make quite apparent the criminal negligence which accompanies the use of an open flame light around a generator at any time. A portable incandescent electric lamp is the only source of illumination which should be legally permitted.

### Welding Apparatus Perfection.

The welding apparatus proper—blow-pipe, torch, etc.—has been brought to a very high state of perfection by the various makers, and all the details such as control valves, flexible piping, etc., are capable of satisfactory service for long periods. In spite of care, couplings will become loose, careless workmen may burn holes in hose pipe, etc., and these defects are not readily detected because of the all pervading odor of acetylene gas which is an almost unavoidable feature of all plants. An accumulation of such small leakages may have disastrous consequences to the operator.

Hazards resulting from the foregoing conditions are of an active nature and their results are rapid and evident.

Hazards of a passive, but not less certain and detrimental nature are those which affect the operator physically and continually.

The most attractive feature of gas welding is the intensely strong light which is given off by the flame. While an ignorant and stubborn operator may spurn the use of protecting glasses, the effect on the sight soon makes itself felt, so that for self protection alone the adoption of glasses is a matter which soon adjusts itself. Recent experiments with tinted lenses in efforts to obviate the blinding effect of automobile head-

lights, have brought about the use of amber colored glass which effectually removes the glare without obstructing the vision so much as the ordinary smoked lenses do.

In addition to having them of the most suitable tint, the lenses should be of substantial dimensions and firmly secured in a strong frame. The presence of foreign substances may cause sparks of molten metal to be thrown off the work, and occasional moisture causes spurring of the job which should be properly guarded against.

### Constitutional Feature.

Lastly the effect of the work generally may be such that occasionally a particularly expert operator, through some constitutional weakness, may be incapacitated much more quickly than another operator less expert but more robust. One has merely to consider the intense heat of the flame to realize that metallic vapors are being given off by the work in close proximity to the operator's face. The products of combustion from the flame itself may well be detrimental to the health without the addition of fumes from copper, aluminum, zinc, etc. The use of a helmet such as is used by sand-blasters is the least protection that can be taken and if used along with a respirator may delay but not permanently prevent the results of continued occupation on welding work.



## SPACING OF MACHINES A FACTOR OF SAFETY.

By R. James.

ONE of the causes of industrial accidents is the system—or lack of system—that prevails in many establishments of placing machines without regard to their particular production or the output of those in the immediate vicinity.

How often can one observe the apparently crowded condition of many shops, especially where want of space and need of extra tools almost demand these conditions.

Too often this is done with a view of economy, but very often this same apparent saving has been the cause of many accidents.

To produce satisfactory results from the operation of almost any machine, sufficient space must be left about the floor for the convenience of the operator and also for the product before and after the machining operations.



If this space is not available, the freedom of action of the operator, and therefore the output, must be restricted.

Where two or more machines are crowded together it prevents the operators from giving proper attention to their respective duties.

If the men are on a day rate system, and the movements of one in placing or removing work interferes with the other, the second operator, in many cases, must remain idle while the first performs his necessary task.

If the men are working on a piece work basis, the second man will continue his duties, often at the risk of injury to some portion of his body.

The writer has observed an operator turning a wooden pattern, at high speed, on an engine lathe, the face plate of which was directly in line with another man working a lathe a few feet away; suddenly, without any warning the tool lifts the pattern from the face plate and portions of the flying wood are projected at the man working opposite, fortunately missing him by a few inches.

#### Contracted Aisles.

Sometimes, owing to lack of sufficient space in the aisle between machines, when work must be carried from place to place, a slight slip or shove may cause a person to stumble, forcing him to put out his hand to protect himself from falling. This effort may cause his hand to come in contact with levers or moving mechanisms and the result is possibly an accident to himself or someone working close at hand.

Another source of trouble may result from the placing of machines, such as screw machines and hollow spindle lathes, etc., in positions where the projecting parts will cross an aisle or protrude in close proximity to a bench, where other workmen must pass, and often before a warning can be given, the clothes or flesh is badly torn.

A pile of castings or other material will sometimes be placed (perhaps temporarily) in a location where a workman is accustomed to perform his usual duties and is often the cause of injury.

Often, when an accident has happened the injured person must bear the blame, when in reality the local conditions are responsible.

#### Dust Feature.

The cause of many a short life machine can be traced to the locating of said machine too close to the flying dust and particles from an adjacent grinding machine. The dust from the continual grinding penetrates to all parts of the machine, and the movable parts receive a large supply of this destroying agent; the destruction is so gradual that when the fault is at last noticed the injury,

in many cases is beyond repair, or when repaired is not satisfactory.

While the universal cry of "Safety First" is being advocated, any improvement in these conditions would be a step in the direction of advanced economy and increased production, as well as the bettering of the working conditions and moral responsibilities of employer and employee.



### BRASS MIXTURES FOR PLUMBERS AND STEAMFITTERS.

By P. W. Blair.

THE wide variety of its application in commercial and artistic lines gives to the making of brass a scope unequalled by few metals. A mixture or alloy designed for any given purpose may be useless for any other purpose. Therefore, the mixture of the metal for any purpose of manufacture is of the most importance. The compound must be so prepared that it will fully meet the conditions under which the article manufactured will be used. Owing to the hard usages and wear that plumbing and steam brass goods are subjected to, and the constant pressure on same, manufacturers of the above lines are improving the quality and alloys of metals they use in the manufacture of this line of goods.

The leading concerns employ a metallurgist in their foundry and know how to mix their metals by analysis and practice by scientific melting in place of the rule and thumb method previously employed, and get results.

The leading authorities on brass goods differ on the question of what really makes the best mixture, but they are agreed that copper in excess of zinc produces the best grade of brass. Copper, however, has inherent defects as a metal which must be overcome by the judicious use of alloys.

#### Mixture for Good Results.

The following compound is recognized by the leading metallurgists to produce the best results for plumbing and steam brass goods:

Copper . . . . .	85
Zinc . . . . .	6
Lead . . . . .	4
Tin . . . . .	5

100

This produces what is known commercially as red brass, in contra-distinction to yellow brass, which contains less copper and more zinc, and is consequently a much less expensive metal, and which is also of more coarse grain metal and more brittle.

The mixture I have just given the above formula for, might with propriety

be called a bronze composition, as it does not differ materially from the bronze formula given by Hiron, the English authority, which is:

Copper . . . . .	84.0
Tin . . . . .	2.9
Lead . . . . .	4.8
Zinc . . . . .	8.3

100

#### Melting, Mixing and Casting.

The mode of melting, mixing and casting has an important bearing in the final result. In the manufacture of plumbing and steam brass goods from red brass, the constituent parts are, of course, of the utmost importance in forming the foundation of the goods, and play an important part in the final results. It must be taken into consideration, also that the mere mixing and casting of the metal would of itself fall short of producing a first-class metal, if it were not also for the particular process by which the metal is prepared in the furnace and the manner in which it is handled in the casting.

Red brass has many advantages compared to yellow brass in the manufacture of plumbing and steam brass goods.

It is much more pleasing to the eye.

There is an absence of the cheap brassy appearance of the goods which shows to a pronounced effect where zinc is used in large quantities.

It is more tenacious, closer grained, and tensile strength is far superior.

It is fibrous and more tenacious than yellow brass which by reason of the large percentage of zinc is a crystalline.

On this last point, Arthur H. Hiron, principal of the School of Metallurgy, Birmingham and Midland Institute says: "The pastiness of zinc manifests itself decidedly in alloys immediately below those which are fibrous, becoming more strongly marked as the alloys are rich in zinc. The fracture of these white alloys is for the most part vitreous, and glassy. Brass goods which contain a large proportion of zinc are much more susceptible to the action of water and other fluids, and more especially steam. The goods of this character become pitted because of the presence of zinc and are therefore rendered inefficient."

#### Brass Fittings Underground.

This is especially true of brass goods which are placed in the ground, for then they must resist not only the action of the water and fluids, but also the action of the earth as well.

In its strength and qualities red brass is like a piece of good oak, white yellow brass is like a pine board and its wearing qualities are therefore not comparable with red brass.



# PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

## PLAIN TURNING MACHINE.

**T**O meet the demand for a simple and convenient machine adapted to plain turning requirements, the Bridgford Machine Tool Works of Rochester, N.Y., have put on the market the lathe illustrated and described in

are designed to use the well-known "Landis" stationary type pipe die heads, which cover an exceptionally wide range with but one set of chasers. They are massive in construction and are equipped with the most improved mechanical and safety attachments.

head, and one 4-inch (six chaser) head. The Landis chasers are milled from flat bar steel and are hardened their entire length, and unless otherwise specified, are made of high-speed steel for Briggs' standard thread.

It is unnecessary to anneal, hob, or re-temper these chasers during their normal life, which is claimed to be frequently from ten to twenty times that of ordinary style chasers. In addition, the flexible rake and natural clearance between the serrated face of the tool and the surface of the work, eliminate all unnecessary friction at the cutting edge and render it possible to operate at a very high speed. The design of the 2-inch head allows the same chasers to be used for both right and left-hand threading, but the 4-inch head is limited to right-hand work. A point which calls for special attention is the fact that the cutting edge of the chasers can be located in the correct position at any time, irrespective of the amount of wear. The method adopted is simple, and insures the use of uniform and permanent cutting edges at all times.

Distinctive features of design include a universal centering chuck at the rear of the spindle; a one-piece frame with fluid-tight bottom; an accessible cone pulley on top of the machine; and all drive gears enclosed to comply with various factory inspection laws. The equipment is complete and includes

this article. It has fewer parts than an engine lathe, is very powerful, and is simple and convenient of operation.

There are three mechanical speed changes through heavy cut steel gearing and the use of a two-speed countershaft as furnished with the machine increases the speeds available to six. The feed box gives four changes of feed for each change of gear at the end of the lathe.

The gearing throughout is of steel, the gears for the speed and feed mechanism running in a bath of oil. The main driving gear is  $6\frac{1}{2}$  in. face, 3 pitch, with all other gearing in proportion. When motor driven, a 25 h.p. motor is employed. The drive is through constant speed pulley, the two levers at the front of the machine controlling all changes of speeds and feeds.

The lathe swings 27 in. over the ways,  $13\frac{1}{2}$  in. over the carriages, takes 8 ft. between centres with standard length of bed, and will work the best of high speed steels to the limit. It can be furnished with one or two carriages as desired.



## PIPE THREADING AND CUTTING MACHINE.

**T**HE ability to thread, ream and cut pipe in one continuous operation at twice the speed of existing machines is claimed by the Landis Machine Co., Waynesboro, Pa., for a new line of pipe threading and cutting machines which has been developed and recently placed on the market. These machines

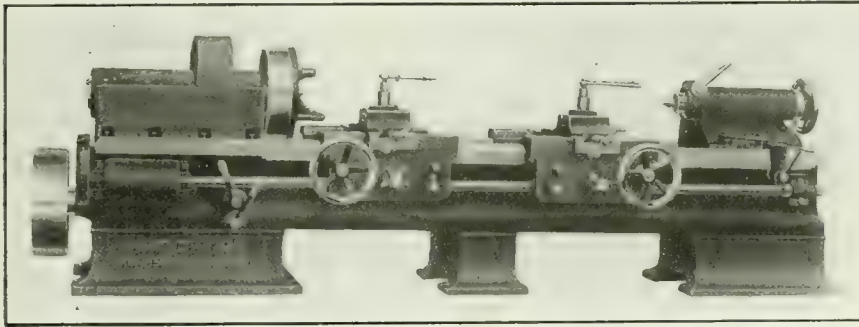
The line consists of three machines capable of threading from 1 inch to 8 inches, inclusive.

The most noteworthy feature of this type of machine is the ease with which it may be adjusted for the different sizes of pipe. This is due to the fact that the die head and gripping chuck have universal diametrical adjustments, and only one set of chasers is required to cover the range of each head.

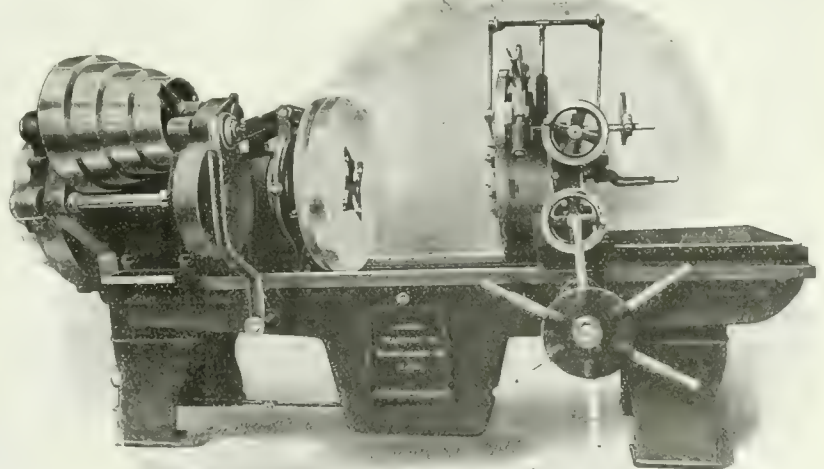
The illustration shows the 4-inch machine, which, along with the 6-inch machine, has a lever operated chuck for

gripping the work. Two stationary type die heads form part of the equipment of each machine, those of the 4-inch machine being one 2-inch (four chaser)

counter-shaft, pump, reaming attachment, cutting-off tool, length gauge, pipe grips, nipple grips, wrenches, etc., to handle the work within its capacity.



NEW PLAIN TURNING MACHINE



"LANDIS" PIPE THREADING AND CUTTING MACHINE.



### APPLICATIONS OF THE HEENAN COOLER.

THE Heenan cooler has met with much success as a medium for cooling air, which is circulated through the windings and about the armatures of large dynamos and motors. It is also employed for water-cooling purposes in internal combustion engines, etc.

This cooler is designed for the rapid and efficient transference of heat between two fluids, one of which (usually air) is in the gaseous, and the other in the liquid, state. The liquid to be cooled is contained in a tank in which a number of cooling cylinders revolve. These cylinders are built up by means of galvanized steel sheeting wound in the form of a spiral, the whole forming a large cooling surface in a very small space. The lower portion of the cylinders dip in the liquid to be cooled, and through the annular spaces of the upper half air is passed. The cylinders revolve at a slow rate, and are thus continually bringing fresh supplies of the liquid into intimate contact with the air. The cooling is effected partially by conduction of heat between the liquid and the air, and also, in most cases, by evaporation.

Where the liquid to be cooled is water, a small portion of the water, which is picked up by the galvanized steel plate, in the form of a film, is evaporated, and the latent heat required for this purpose is extracted from the metal contained in the cooling cylinders and hence from the liquid in the tank. It should be noted that the liquid is spread over galvanized steel sheets in the form of a thin film, and is not broken up into drops or glo-

bules. This means that there is little possibility of a portion of the liquid being carried away from the machine in the form of a loose mixture. The loss by evaporation is, therefore, the minimum possible by which the cooling effect can be produced.

For the purpose of passing air through the machine, a fan is used, which may be of the propeller or centrifugal type, according to the size and design of ma-

special designs are employed when the installation is to be on board ship or for cooling compressed air.

### Cooling Water for Internal Combustion Engines.

One of the advantages of the machine when used for cooling water for an internal combustion engine is that it is positive in its action. By which is meant, there is a definite amount of cooling surface and a definite amount of air is passed through the machine per minute. Thus a constant cooling effect is produced. Experiments have shown that the machine is practically independent of climatic conditions, the action being such that all heat is dissipated as fast as it is generated if the machine is of size and capacity demanded by the engine it is cooling. This is a special advantage, and enables an engine to be run night and day for an indefinite period.

The space occupied by the cooler is small, while at the same time the apparatus is quite economical in the use of water. The cooler can be used to ventilate the engine-room, the air being drawn from the engine-room and discharged to the outside atmosphere. In tropical countries, especially, this is a decided advantage, because the air in the engine-room is generally oppressive.

In plants ranging up to 200 and 300 h.p. the cooler may be arranged so that the pump delivers the cooled water directly into the engine jackets, after leaving which, the water returns direct to the cast iron inlet funnel fitted on the water cooler. The water then flows

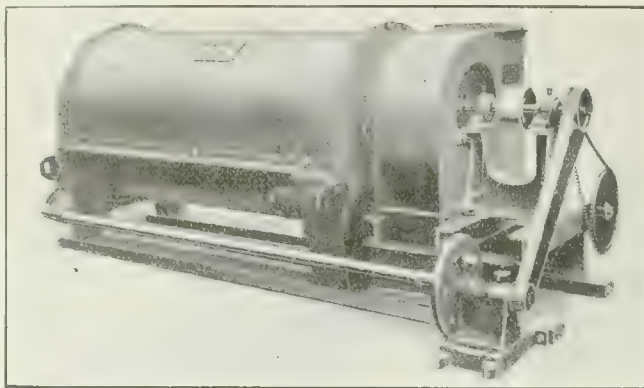


FIG. 1. STANDARD COOLER CENTRIFUGAL FAN TYPE.

chine. A general idea of the construction of these coolers as fitted with centrifugal and propeller fans can be gathered from Figs. 1 and 2. The machines are usually driven by belt on to the fan spindle, the drums being revolved by suitable reduction gearing between the fan and the drum shafts. As the cylinders are mounted on ball bearings, they offer practically no resistance, and as the fans are of high efficiency design and construction, the power required to drive the coolers is a minimum. The standard design is somewhat modified when the coolers are to be used for special purposes and in special places. For example,

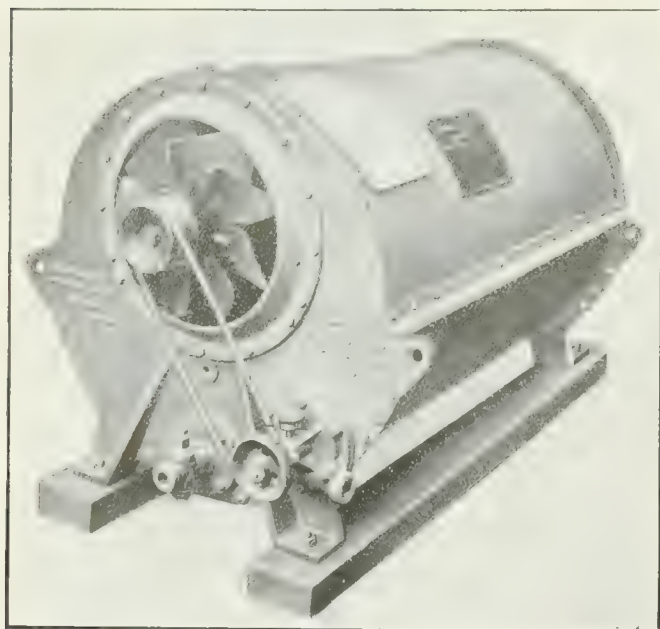


FIG. 2. STANDARD WATER COOLER PROPELLER FAN TYPE.

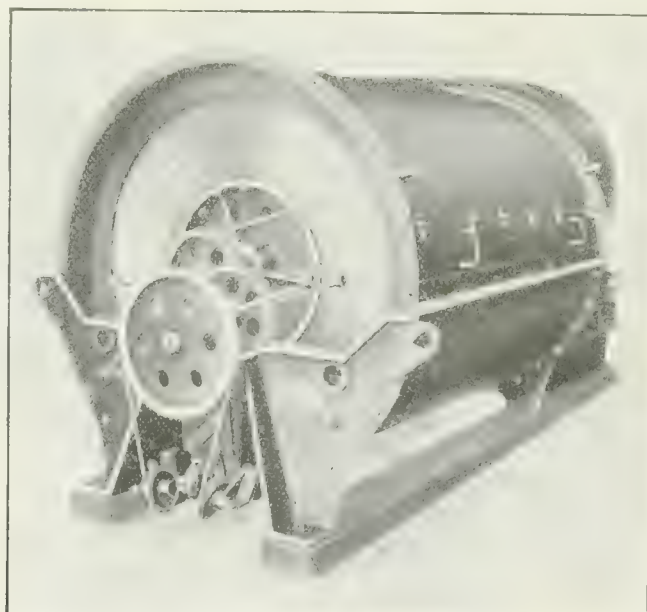


FIG. 3. VIEW OF OPEN END OF STANDARD COOLER.



through the cooler by gravity, and is passed by the circulating pump back to the engine water jackets. The loss of

Fig. 3 shows an arrangement of direct coupled, motor-driven pumps, with the water coolers driven by means of belts

upwards. The duct should be of ample cross sectional area so as to offer no resistance to the passage of the air.

#### Cooling Water Used in Making Ice.

The importance of having cool water for use in plants which are manufacturing ice for commercial purposes hardly need be emphasized. When water is cooled by means of air, the atmospheric wet bulb thermometer limits the temperature to which it can be cooled. An efficient cooling plant is, therefore, necessary to reduce the temperature of water to anything approaching the wet bulb thermometer. With the Heenan cooler it has been shown that it is possible to reduce water to within half a degree or even less of the wet bulb thermometer, but a plant for such a duty would be large and commercially not very economical. Thus, for freezing plants it is the custom to provide machines which will cool the water to within a reasonable limit of the atmospheric wet bulb thermometer. The machine has shown up well under comparative tests in the warm months and in the tropics, and under these conditions shows its best efficiencies. To illustrate the importance of having cool water in a refrigeration plant the following figures will be interesting: One plant, receiving water at 60 degrees F., 70 degrees F., and 80 degrees F., consumed 78.8 h.p., 92.0 h.p., and 106.0 h.p. respectively.

#### Cooling Water for Air Compressors.

Where water is not very plentiful, it is often found useful to install one of

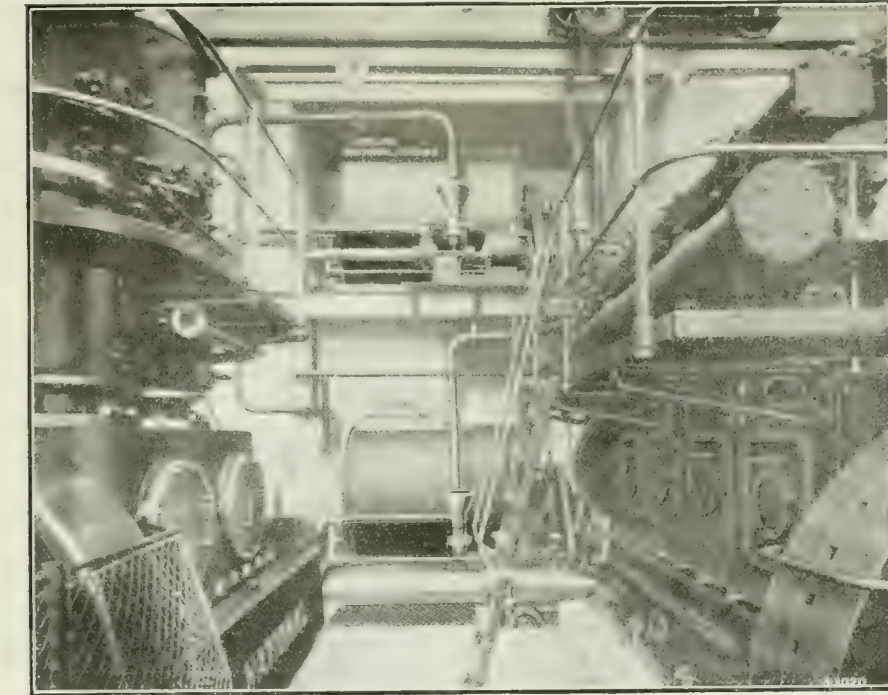


FIG. 3 TWO "HEENAN" COOLERS AT WORK ON TWO 350 HORSE POWER VERTICAL GAS ENGINES.

water by evaporation is made up by means of a float valve fixed in a small galvanized iron tank fitted at the side of the cooler, this float valve being connected up to the town's mains or some other source of supply.

With larger plants it is desirable to provide a small storage in the form of a tank or sump let into the ground. Some engineers have preferred a small overhead storage tank in order to provide a steady head on the engine jackets. Speaking generally, this tank or sump should have a capacity of a few hundred gallons of water, and its purpose is to counteract any unsteadiness of the circulating system at starting up, due to the comparatively small amount of water in circulation. When this system is employed, the float valve for making up the loss of water by evaporation should be fixed in the tank or sump. When the latter is provided, the pump should be arranged to deliver the water from the sump to the engine jackets and thence by gravity through the water cooler back again to the sump. If an overhead tank is provided, the water should flow direct to the engine jackets, and, through the water cooler, be returned to the tank.

Various methods are used to drive the cooler, it being often found convenient to drive the machine by means of a belt from countershafting. When electric current is available, however, a small electric motor is employed, the same motor being used to drive the pump.

from pulleys fitted on the shaft extensions of the motors.

It is usually advisable to provide a duct on the air outlet of the water cooler. This is always necessary when the cooler is installed in the engine-room, and even when the machine is working

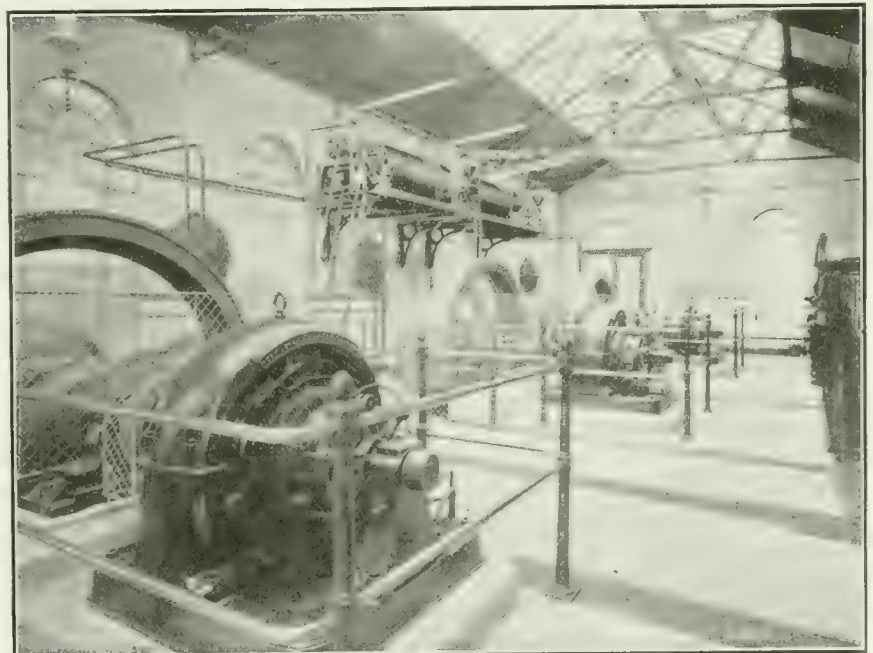


FIG. 4 TWO "HEENAN" COOLERS AT WORK IN A GAS, LIGHT AND COKE PLANT.

in the open air, it is sometimes advisable to provide such a duct, running, say, from ten to twenty feet vertically

these coolers to cool the water as it comes from the water jackets, and thus use the water over and over again.



### Various Applications.

The machines have been arranged to cool compressed air at various pressures; they have also been installed as

been done with speeds up to 20,000 r.p.m. In the larger sizes of machines, 1 in. drills have been successfully run on tests at a speed of 12,000 r.p.m. and a

to keep up easily with the machine. It appears reasonable, therefore, to expect that the commonly used speeds for drilling and feeds of small drills will be greatly increased within the next few years.

The author discusses in detail the possible limitations in drilling practice. Of these, it appears that the wear of the drill is little affected, in the end, by the speed. The cutting edges of the drill are rather preserved than otherwise, at the higher speeds. As regards heating effects, it is claimed that the total heating effect at high speed is less destructive to drills than at slower speeds. The stresses on the drills are less, the drill is advancing rapidly into the cold metal and as the period of drilling an individual hole is short, the proportion of time that the drill is in the air to the time that it is cutting is increased. It appears, also, that at high speed drilling, less heat will be given to the tool by the chips than at low speed drilling. This is due to a hitherto unexplained fact, namely, that when the chips break off, they are cold and uncolored, but become hot and colored a few seconds later. This action has also been observed in milling and turning.



Harmony is a sort of an advance agent of success, and the best way for a foreman to maintain harmony is by being himself harmonious. It is not meant by this that he should be lax in exercising his authority—quite the contrary; but

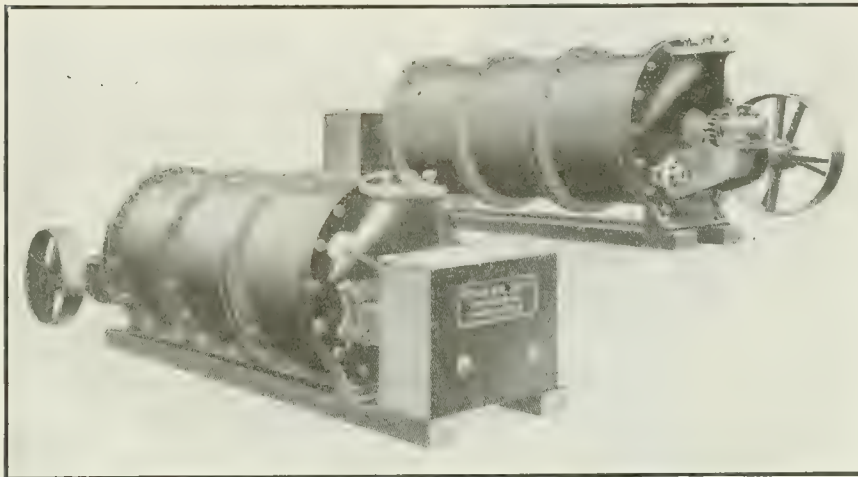


FIG. 6. TWO COMPRESSED AIR COOLERS IN ICE FACTORY.

intercoolers in compressors. The Beals system employs cooled compressed air extensively in refrigeration. The pressure is generally not much over 15 pounds. The air is used to agitate the water during the process of freezing, thus making a clear cake of ice. On board ship, the uses are also many and varied. Many trans-Atlantic liners have the coolers installed.

By cooling the air, and removing thus the moisture in it, a dry blast for blast furnaces has been provided.

In chocolate factories and breweries an extensive application of these coolers has been made with excellent results. In tobacco factories the machine has been employed to produce air with a maximum of humidity, yet at the same time with no loose moisture.

In large steel mills producing forgings oil tempering is used extensively. The oil, of course, gets very warm in the course of time. Air has been introduced into it after passing through the cooler, and has been found to give excellent results.

The machine is manufactured by Messrs. Heenan & Froude, of Worcester, England, the Canadian representatives being Laurie & Lamb, Montreal.



### HIGH SPEED DRILLING.

THE question of high speed drilling was discussed very fully by L. P. Alford, who read a paper on "Some Machine-Tool Developments of 1914," at a recent meeting of the Cleveland Engineering Society.

Last year, some sensitive drilling machines were put on the market, having spindle speeds as high as 10,000 r.p.m., although experimentally, drilling has

feed of 1 in. per second in cast iron. (The author has seen these tests.)

In high speed drilling with numbered sizes of drills it has been found that the limit of the rate of speed is the muscular activity of the operator. Once the drill has entered, it can be pushed through as rapidly as the operator chooses to move his arm. The tendency of power feeds is toward still higher speeds for small drills than can be obtained by hand, and while the limit of speed has been frequently reached with sewing and

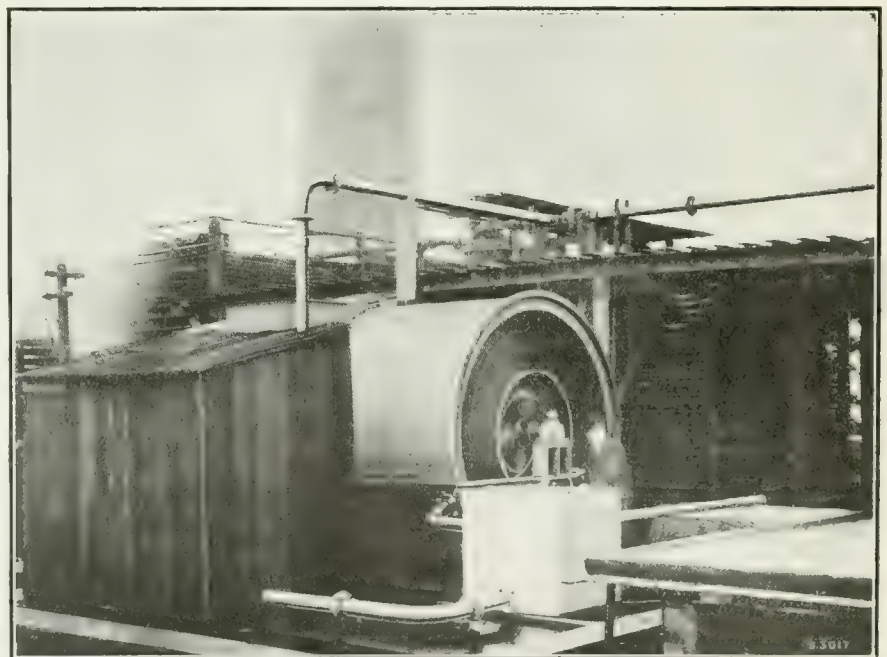


FIG. 7 "HEENAN" COOLER INSTALLED IN 200 TONS CAPACITY COLD STORAGE PLANT FOR COOLING THE CIRCULATING WATER.

shoemaking machines, due to lack of quickness in the operator, with machine tools the operator has always been able

he can exercise it without that bulldog officiousness so repulsive to intelligent workmen.



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### THE WAR UNIQUE IN OPPORTUNITY.

THE facts that the chairmanship of the British Government Inventions Committee was offered to and has been accepted by no less a personage than Baron Fisher indicate at once the outstanding difference between the present war and those that have preceded it.

Since the days of Napoleon, none of the wars in which Great Britain has been involved have appealed so directly and irresistibly to her people. Many of us here in Canada, who a year ago did not know the difference between shrapnel and lyddite shells are not only now familiar with these missiles in their every detail, but are in addition sufficiently well posted as to converse fluently and confidently on matters military and naval generally.

Do we pause at all to consider these changed condi-

tions? The conduct of wars in the past was almost entirely a Government affair. The training of men, the manufacture of munitions, the procuring of stores, arranging of transport and a myriad other activities connected with campaigning, were all carried out in more or less secrecy by Government Departments; the public meanwhile acquiring their knowledge of what was transpiring through the medium of the newspapers. Information so acquired was, of course somewhat scrappy, and as a result no very keen general interest was aroused.

In the present struggle tremendous issues are at stake, and of necessity our people must not only be conversant with these but so adjust themselves as to secure for our Empire an ultimate and abundant justification reward. To this end the united efforts of our manufacturers are bent towards the production of military commodities. Every little factory with power available feels called upon to assist, all of which plainly indicates that the successful prosecution of the present grim struggle is wholly dependent on the vigorous application of the knowledge acquired in the pursuit of peace time business.

To engineers more than to the members of any other profession this war has brought opportunity, and both in the workshop and office, and in the field we believe this many-sided craft is directing its energies to produce the most effectively helpful results. By those in the field, and they are numbered in thousands it is but reasonable to expect that numerous devices, ideas and contrivances have been evolved and put into practice, the dual recommendation of promptness and suitability ensuring the necessary appreciation.

Canadian engineers although working several thousand miles away from the storm centre of the war, need not feel that distance detracts from the value of their efforts. It may be of course that some may judge us by the number of shells shipped in a given time, or by some similar numerical production basis, yet it should not be forgotten by even our smallest employer or by our humblest employee that the sum of much indirect effort may even help as much if not surpass that obtainable from a brilliant technical invention of, it may be, restricted application. Various ideas have been adopted by shell makers in performing minor operations, which, had they been proposed with all seriousness in peace time, would possibly have received scant consideration by munition experts. One instance may suffice to show how the present exigency has operated to the mutual benefit of both War Office and shell makers.

In making shells in peace time it was required that the inside of the shell be machined all over so as to ensure a uniform thickness of wall, and perfect balance. This was not specified on shells made here, but on many occasions objection was raised to the amount of forging scale on the inside. This could only be removed with difficulty and with much loss of time if attempted with orthodox appliances. A boiler tube cleaner of the centrifugal type when revolved in a suitable fixture successfully overcame the trouble, but wouldn't it have been some shock if a shell maker had informed a munitions expert that a boiler tube cleaner was increasing the output by 30 per cent.

Instances such as these are of frequent occurrence, and the free exchange of ideas between shell makers in Canada and all over the Empire is only one of many indirect efforts, the combined effect of which will not only aid in bringing the war to a desirable termination, but will establish a common bond of manufacturing interest which is certain to have a powerful influence on the recovery and further development of British Commerce when ploughshares and pruning hooks again resume their normal occupations.



# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON.

Grey Forge, Pittsburgh	\$13 20	\$13 45
Lake Superior, charcoal, Chicago		15 75
Ferro Nickel pig iron (Soo)		25 00

Montreal. Toronto.

Middlesboro, No. 3	21 00	
Carron, special	22 00	
Carron, soft	22 00	
Cleveland, No. 3	21 00	
Clarence, No. 3	21 00	
Glengarnock	25 00	
Summerlee, No. 1	25 00	
Summerlee, No. 3	25 00	
Michigan charcoal iron	25 00	
Victoria, No. 1	21 00	19 00
Victoria, No. 2X	21 00	19 00
Victoria, No. 2 Plain	21 00	19 00
Hamilton, No. 1	20 00	19 00
Hamilton, No. 2	20 00	19 00

## FINISHED IRON AND STEEL.

Per Pound to Large Buyers.	Cents.
Common bar iron, f.o.b., Toronto	2.20
Steel bars, f.o.b., Toronto	2.20
Common bar iron, f.o.b., Montreal	2.20
Steel bars, f.o.b., Montreal	2.20
Bessemer rails, heavy, at mill	1.25
Steel bars, Pittsburgh	1.25
Twisted reinforcing bars	2.15
Tank plates, Pittsburgh	1.25
Beams and angles, Pittsburgh	1.25
Steel hoops, Pittsburgh	1.30
F.O.B., Toronto Warehouse.	Cents.
Steel bars	2.10
Small shapes	2.35
Warehouse, Freight and Duty to Pay.	Cents.
Steel bars	1.90
Structural shapes	1.95
Plates	1.95

Freight, Pittsburgh to Toronto.

18.9 cents earload; 22.1 cents less earload.

## BOILER PLATES.

	Montreal.	Toronto.
Plates, 1/4 to 1/2 in., 100 lb.	\$2 35	\$2 25
Heads, per 100 lb.	2 55	2 45
Tank plates, 3-16 in.	2 60	2 45

## OLD MATERIAL.

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	\$12 50	\$12 50
Copper, crucible	14 50	14 50
Copper, unch-bled, heavy	14 00	14 00
Copper, wire, unch-bled	14 00	14 00
No. 1 machine, compos'n	11 50	12 50
No. 1 compos'n turnings	10 50	9 25
No. 1 wrought iron	6 00	6 00
Heavy melting steel	5 75	6 00
No. 1 machin'y cast iron	10 50	10 50
New brass clippings	12 00	12 00
No. 1 brass turnings	10 00	10 00
Heavy lead	4 50	4 75

Tea lead	\$3 50	\$3 50
Scrap zinc	12 00	13 00

## W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect June 25, 1915:

	Buttweld Black Standard	Gal.	Lapweld Black	Gal.
1 1/4, 3/4 in.	63	32 1/2		
1/2 in.	68	41 1/2		
3/4 to 1 1/2 in.	73	46 1/2		
2 in.	73	46 1/2	69	42 1/2
2 1/2 to 4 in.	73	46 1/2	72	45 1/2
4 1/2, 5, 6 in.			70	43 1/2
7, 8, 10 in.			67	40 1/2
X Strong P. E.				
1/4, 3/8 in.	56	32 1/2		
1/2 in.	63	39 1/2		
3/4 to 1 1/2 in.	67	43 1/2		
2, 2 1/2, 3 in.	68	44 1/2		
2 in.			63	39 1/2
2 1/2 to 4 in.			63	42 1/2
4 1/2, 5, 6 in.			66	42 1/2
7, 8 in.			59	35 1/2
XX Strong P. E.				
1/2 to 2 in.	44	20 1/2		
2 1/2 to 6 in.			43	19 1/2
7 to 8 in.			40	16 1/2
Genuine Wrot Iron.				
3/8 in.	57	26 1/2		
1/2 in.	62	35 1/2		
3/4 to 1 1/2 in.	67	40 1/2		
2 in.	67	40 1/2	63	36 1/2
2 1/2, 3 in.	67	40 1/2	66	39 1/2
3 1/2, 4 in.			66	39 1/2
4 1/2, 5, 6 in.			63	36 1/2
7, 8 in.			60	33 1/2

## Wrought Nipples.

4 in. and under	77 1/2 %
4 1/2 in. and larger	72 1/2 %
4 in. and under, running thread	57 1/2 %
Standard Couplings.	
4 in. and under	60 %
4 1/2 in. and larger	40 %

## MILLED PRODUCTS.

Sq. & Hex. Head Cap Screws	65 %
Sq. Head Set Screws	65 & 10 %
Rd. & Fil. Head Cap Screws	45 %
Flat & But. Head Cap Screws	40 %
Finished Nuts up to 1 in.	70 %
Finished Nuts over 1 in. N.	70 %
Semi-Fin. Nuts up to 1 in.	70 %
Semi-Fin. Nuts over 1 in.	72 %
Studs	65 %

## METALS.

	Montreal.	Toronto.
Lake copper, earload	\$21 00	\$21 00
Electrolytic copper	20 75	20 75
Castings, copper	20 50	20 50
Tin	42 00	42 00
Spelter	25 00	25 00
Lead	7 25	7 25
Antimony	40 00	40 00
Aluminum	40 00	40 00

Prices per 100 lbs.

## BILLETS.

	Per Gross Ton
Bessemer, billets, Pittsburgh	\$22 00
Openhearth billets, Pittsburgh	22 00
Forging billets, Pittsburgh	28 00
Wire rods, Pittsburgh	25 50

## NAILS AND SPIKES.

Standard steel wire nails, base	\$2 40	\$2 35
Cut nails	2 50	2 70
Miscellaneous wire nails	75 per cent.	
Pressed spikes, 5/8 diam., 100 lbs.	2 85	

## BOLTS, NUTS AND SCREWS.

	Per Cent.
Coach and lag screws	75
Stove bolts	80
Plate washers	40
Machine bolts, 3/8 and less	70
Machine bolts, 7-16 and over	60
Blank bolts	60
Bolt ends	60
Machine screws, iron, brass	35 p.c.
Nuts, square, all sizes	.4 1/4 c per lb. off
Nuts, Hexagon, all sizes	.4 3/4 c per lb. off
Iron rivets	72 1/2 per cent.
Boiler rivets, base, 3/4-in. and larger	\$3.25
Structural rivets, as above	3.25
Wood screws, flathead, bright	.85, 10, 7 1/2, 10 p.c. off
Wood screws, flathead, Brass	.75 p.c. off
Wood screws, flathead, Bronze	.70 p.c. off

## LIST PRICES OF W. I. PIPE.

Standard.	Extra Strong.	D. Ex. Strong.
Nom. Price.	Size Price.	Size Price.
Diam. per ft.	Ins. per ft.	Ins. per ft.
1/8 in. \$ .05 1/2	1/8 in. \$ .12	1/2 \$ .32
1/4 in. .06	1/4 in. .07 1/2	3/4 .35
3/8 in. .06	3/8 in. .07 1/2	1 .37
1/2 in. .08 1/2	1/2 in. .11	1 1/4 .52 1/2
3/4 in. .11 1/2	3/4 in. .15	1 1/2 .65
1 in. .17 1/2	1 in. .22	2 .91
1 1/4 in. .23 1/2	1 1/4 in. .30	2 1/2 1.37
1 1/2 in. .27 1/2	1 1/2 in. .36 1/2	3 1.86
2 in. .37	2 in. .50 1/2	3 1/2 2.30
2 1/2 in. .58 1/2	2 1/2 in. .77	4 2.76
3 in. .76 1/2	3 in. 1.03	4 1/2 3.26
3 1/2 in. .92	3 1/2 in. 1.25	5 3.86
4 in. 1.09	4 in. 1.50	6 5.32
4 1/2 in. 1.27	4 1/2 in. 1.80	7 6.35
5 in. 1.48	5 in. 2.08	8 7.25
6 in. 1.92	6 in. 2.86	
7 in. 2.38	7 in. 3.81	
8 in. 2.50	8 in. 4.34	
8 in. 2.88	9 in. 4.90	
9 in. 3.45	10 in. 5.48	
10 in. 3.20		
10 in. 3.50		
10 in. 4.12		



**COKE AND COAL.**

Solvay Foundry Coke .....	\$5.75
Connellsville Foundry Coke...	4.85-5.15
Yough, Steam Lump Coal .....	3.83
Penn. Steam Lump Coal .....	3.63
Best Slack .....	2.99

Net ton f.o.b. Toronto.

**COLD DRAWN STEEL SHAFTING.**

At mill .....	40%
At warehouse .....	40%
Discounts off new list. Warehouse price at Montreal and Toronto.	

**MISCELLANEOUS.**

Solder, half-and-half .....	.263 1/2
Putty, 100-lb. drums ..	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.67
Glue, French medal, per lb. ....	0.18
Tarred slaters' paper, per roll ..	0.95
Motor gasoline, single bbls., gal..	0.18
Benzine, single bbls., per gal. ...	0.18
Pure turpentine, single bbls. ....	0.66
Linseed oil, raw, single bbls. ....	0.67
Linseed oil, boiled, single bbls. ..	0.70
Plaster of Paris, per bbl. ....	2.50
Plumbers' Oakum, per 100 lbs. ...	4.00
Lead wool, per lb. ....	0.10
Pure Manila rope .....	0.16
Transmission rope, Manila.....	0.19 1/2
Drilling cables, Manila .....	0.17 1/2
Lard oil, per gal. ....	0.60

**POLISHED DRILL ROD.**

Discount off list, Montreal and Toronto .....	40%
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**PROOF COIL CHAIN.**

1/4 inch .....	\$8.00
5-16 inch .....	5.35
3/8 inch .....	4.60
7-16 inch .....	4.30
1/2 inch .....	4.05
9-16 inch .....	4.05
5/8 inch .....	3.90
3/4 inch .....	3.85
7/8 inch .....	3.65
1 inch .....	3.45

Above quotations are per 100 lbs.

**TWIST DRILLS.**

Carbon up to 1 1/2 in. ....	60
Carbon over 1 1/2 in. ....	25
High Speed .....	40
Blacksmith .....	60
Bit Stock .....	60 and 5
Centre Drill .....	20
Ratchet .....	20
Combined drill and c.t.s.k. ....	15

Discounts off standard list.

**REAMERS.**

Hand .....	25
Shell .....	25
Bit Stock .....	25
Bridge .....	65
Taper Pin .....	25
Centre .....	25
Pipe Reamers .....	80

Discounts off standard list.

**IRON PIPE FITTINGS.**

Canadian malleable, 35 per cent.; cast iron, 60; standard bushings, 60; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

**TAPES.**

Chesterman Metallic, 50 ft. ....	\$2.00
Lufkin Metallic, 603, 50 ft. ....	2.00
Admiral Steel Tape, 50 ft. ....	2.75
Admiral Steel Tape, 100 ft. ....	4.45
Major Jun., Steel Tape, 50 ft. ....	3.50
Rival Steel Tape, 50 ft. ....	2.75
Rival Steel Tape, 100 ft. ....	4.45
Reliable Jun., Steel Tape, 50 ft. ..	3.50

**SHEETS.**

	Montreal	Toronto
Sheets, black, No. 28.....	\$3 00	\$2 90
Canada plates, dull,		
52 sheets .....	3 25	3 50
Canada Plates, all bright6	4 40	4 60
Apollo brand, 10 3/4 oz.		
galvanized) .....	6 40	5 95
Queen's Head, 28 B.W.G.	6 50	6 50
Lleur-de-Lis, 28 B.W.G....	5 75	5 75
Gorbal's Best, No. 28....	6 50	6 50
Viking metal, No. 28....	6 00	6 00
Colborne Crown, No. 28..	5 38	5 30

**BOILER TUBES.**

Size	Seamless	Lapwelded
1 in. ....	\$10 00	.....
1 1/4 in. ....	10 00	.....
1 1/2 in. ....	10 00	.....
1 3/4 in. ....	10 00	.....
2 in. ....	10 50	9 20
2 1/4 in. ....	12 10	.....
2 1/2 in. ....	13 05	12 19
3 in. ....	15 75	12 70
3 1/4 in. ....	.....	13 90
3 1/2 in. ....	20 00	15 00
4 in. ....	25 50	18 90

Prices per 100 feet, Montreal and Toronto.

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, sgle. and dble. ....	50%
Standard .....	50 & 10%
Cut leather lacing, No. 1 .....	\$1.20
Leather in sides .....	1.10

**ELECTRIC WELD COIL CHAIN B.B.**

3-16 in. ....	\$9.00
1/4 in. ....	6.25
5-16 in. ....	4.65
3/8 in. ....	4.00
7-16 in. ....	4.00
1/2 in. ....	4.00

Prices per 100 lbs.

**WASTE.**

	WHITE.	Cents per lb.
XXX Extra .....	0 10 1/4	
X Grand .....	0 09 3/4	
XLGR .....	0 09 1/4	
X Empire .....	0 08 1/2	
X Press .....	0 07 3/4	
	COLORED.	
Lion .....	0 07 1/8	
Standard .....	0 06 3/8	
Popular .....	0 05 3/4	
Keen .....	0 05 1/4	

**WOOL PACKING.**

Arrow .....	0 16
Axle .....	0 11
Anvil .....	0 08
Anchor .....	0 07

**WASHED WIPERS.**

Select White ..	0 09
Mixed Colored ..	0 06 1/2
Dark Colored ..	0 05 1/4

This list subject to trade discount for quantity.

**BELTING RUBBER.**

Standard ..	50%
Best grades .....	30%

## The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Toronto, Ont., August 3, 1915.—

There is little change to note as regards the general trend of business. Industrial conditions continue to show some improvement, due largely to war orders, but also on account of the beneficial effect on trade generally resulting from these orders. This war business has materially helped to minimize the depression, while the expectation of a steady volume of business of this description is helping to maintain an optimistic spirit in business circles. The first year of the war—a year without a parallel—is closing with trade conditions far better than was anticipated, say, ten months ago. In the first month or so of this period, in-

dustrial conditions were in a chaotic state, but the banks and manufacturers took hold of the situation, with gratifying results. Large orders for war equipment were placed later on, and a gradual recovery followed, which became more pronounced as the effect of these orders was felt. This is particularly noticeable in the trade returns, which now show a large increase in exports; a distinctly favorable feature. It must, of course, be admitted that the war has adversely affected some lines of business, but against this, many others have been stimulated, the manufacture of munitions being perhaps the most striking example.



### Steel Market.

Conditions in the iron and steel trade continue satisfactory, due almost entirely to war business, including, of course, shell steel. The mills are actively engaged in producing forgings and bars for shells, production having increased. Reports regarding the Dominion Steel Corporation are very satisfactory, this plant operating at over 90 per cent. of capacity. The Steel Company of Canada and the Nova Scotia Steel & Coal Co. are also working to capacity on war lines.

The situation in the galvanized sheet trade is still unsatisfactory, although prices of sheets have a weak tendency on account of the decline in the spelter market. Local quotations on galvanized sheets, however, are unchanged, and there is no immediate prospect of a reduction, as spelter at the present price is too high to be on a commercial basis.

Conditions in the steel trade in the States continue to improve, and quotations on bars are holding firm. There is a large export demand for bars for shells, and inquiries also represent a large tonnage. It is reported from Buffalo that Canadian interests have been in that market recently for 3,000 tons of billets, but are unable to place the order there.

There is no improvement in the high-speed tool steel situation, as supplies of tungsten are becoming more difficult to obtain. The British Government has placed an embargo on high-speed tool steel to foreign countries; this will not, of course, affect Canada except that the demand in the Old Country is so great that the mills will have difficulty in meeting the demand here. Prices have advanced about 75 per cent., with the probability of them going still higher. This applies to American brands as well as British. Carbon tool steel has advanced slightly, but is not affected by the conditions surrounding high-speed tool steel.

### Pig Iron.

The market continues stagnant, with nothing of particular importance to note. Quotations are unchanged.

### Scrap Metals.

The market is keeping steady and the general situation unchanged. Quotations are holding firm except for heavy and tea lead, which have declined, and are now being quoted at 4<sup>3</sup>/<sub>4</sub>c and 3<sup>1</sup>/<sub>2</sub>c respectively. Scrap iron is dull, but unchanged.

### Machine Tools.

Inquiries continue to flow in for shell equipment, although the amount of business booked has fallen off somewhat. Dealers, however, are not complaining, and anticipate a revival in due course. Far off deliveries are inducing prospec-

tive shell manufacturers to place their orders, and in this they are wise, for the extraordinary demand in Canada and the States for machine tools is taxing the makers to the limit. It is almost a question of first come, first served. The demand for second-hand equipment is as

### CANADIAN GOVERNMENT PURCHASING COMMISSION.

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George Gault, Winnipeg; Henry Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

brisk as ever, suitable tools being quickly snapped up.

### Supplies.

Business in machine shop supplies continues very satisfactory, and prices generally are holding firm. There is a good demand for lathe chucks, twist drills, high-speed tool steel, waste, cutting compound, belting, etc. The linseed oil market is weak and prices have declined 4c, oil being now quoted at 67c for raw and 70c for boiled.

### ALLIES PURCHASING AGENTS.

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:—

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendance Ministère de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian.—Messrs. S. Ruperti and Alexsieff, care Military Attache, Russian Embassy, Washington, D.C.

### Metals.

There are few price changes to note this week, and the market generally is dull. The tin market continues to decline, due to weakness, in London. The copper market is very dull, but quotations are unchanged. The spelter market is easier and lead unsettled, while antimony is very dull. The demand for metals for munitions is brisk, and ordinary business is gradually improving.

**Tin.**—The market continues to decline in London, due to lack of support. The New York market, however, is comparatively steady. Business continues dull, with little demand for spot tin. Tin has declined 2c, and is being quoted at 42c per pound.

**Copper.**—The market is very dull and prices are unchanged. It is reported from New York that the actual business placed both for home consumption and export during the month of July has probably been less than for any other month this year. Copper is quoted locally at 21c per pound.

**Spelter.**—Good business is reported for all deliveries, but buying is almost entirely on account of war orders, both directly and indirectly. The market has an easier tone, but quotations are unchanged and nominal at 25c per pound.

**Lead.**—The market is weak, and it is probable that the "Trust" will reduce their quotation from 5.75c, New York. Local quotations are unchanged at 7<sup>1</sup>/<sub>4</sub>c per pound.

**Antimony.**—The market is very firm, and makers are almost in a position to demand their own terms. There is no likelihood of any excessive supply of raw material becoming available. Quotations are nominal and unchanged at 40c per pound.

**Aluminum.**—The market is firm and the price unchanged. Local quotations are nominal at 40c per pound.



### BIG INCREASE IN EXPORTS.

THE anniversary of Great Britain's declaration of war directs attention to Canada's accomplishments and some of the more outstanding results of the conflict as affecting this country.

The initial step, taken before the formal declaration of war was the offer by the Prime Minister of military assistance in the event of hostilities. Immediately after the war broke out, a complete Canadian division was accepted and hurried mobilization and equipment arranged for. It started on the 25th September, 1914, wintered at Salisbury, and in early spring went to France. The story of St. Julien, Ypres, Festubert, and Givenchy speaks of the character and the results.

### 70,000 Are Overseas.

Since then there has been more and steady recruiting, till about 140,000 men have been enlisted. Of this number upwards of seventy thousand are now overseas. Reinforcements are going ahead constantly. It is the intention to maintain in the field two complete divisions, and a third one may, quite possibly, be put there. In fact, there is no telling to what extent Canadian resources of men and munitions may be



drawn on. A Russian retirement in the east and the return westward of German hordes might easily produce conditions calling for much greater assistance from this country than has heretofore been thought necessary.

#### Exports Have Increased.

The war has interfered with trade, and has completely changed the balance of it, so much so that last month the figures of export exceeded imports by thirty-five millions. Import trade has dwindled materially, while exports, raw and manufactured, have much increased. While many lines of business have been adversely affected, the war has stimulated industry connected with munitions and equipment for the forces.

An estimate of war orders in Canada places the total at approximately three hundred and fifty million dollars. This includes orders by the Canadian and allied governments. Orders for shells alone are estimated at one hundred and fifty-two million dollars. About 160 factories are turning them out.

#### Revenue Goes Up.

The revenues which immediately started to decline after the war, were not very successfully arrested by the taxes imposed at the special session of Parliament in August. Those adopted by the last budget, however, have caused the revenue since then to equal and in most cases exceed what it was in the ante bellum months of last year. The war is being financed by British loans, while public works are being carried on by loans from Britain and the United States. The small jobs have been shut down, but the big undertakings are all going ahead. This policy has been followed from the start.

Canada has spent nearly a hundred millions on the war. It costs three hundred millions to run the country this year, and of this amount the war is costing half a million a day. The big item of outlay is the pay of officers and men. On equipment, about thirty millions has so far been spent. Speaking financially, while money is available for war purposes, municipal corporate or individual borrowings have been greatly restricted. There is no prospect of the flotation of a loan in Canada for the reason that all the money available is needed for commercial domestic purposes.

#### Recruiting.

Just at present efforts are being concentrated upon recruiting of the new regiments and their equipment. The work has gone ahead splendidly, but the figures of enlistment in the past month admit of improvement. This applies to all military divisions, but it is quite probable that harvesting activities have much to do with the situation, and that

when they are finished, enlistment will rapidly be augmented.



#### MORE TONNAGE NEEDED.

THE Dominion Government is investigating the situation as regards the scarcity of Canadian tonnage, with a view to alleviating conditions in anticipation of the movement of the wheat crop. Representations are being made to the Imperial authorities and will be supplemented with information as to the increase in tonnage necessary to carry the crop without dislocating Canadian trade in general.

So far there has been no definite outcome of these negotiations. It has been represented from time to time that prize vessels captured from Germany and Austria should be placed in the mercantile service, but so far the Imperial Government have not consented. It is understood that this is one of the questions which Sir Robert Borden is taking up with the authorities in England, although there is no truth in the report that the Premier is arranging for the taking over of the Canadian crop.



#### THE ATLANTIC IN WAR TIME.

IN the harbor at St. John or Halifax, according to the Canadian Gazette, may be seen a number of the old square-rigged Canadian sailing vessels loading up for England. These relics of the nautical past are helping to fill the gap made by "orders of the Admiralty" in the ranks of the regular cargo boats. There is money in the business. British importers of Canadian timber, for instance, have now to pay £6 10s. per standard of 165 cubic feet for freight from St. John to Old Country ports.

One old "tub," to use the irreverent phraseology of the modern gold-laced officer in the merchant service, was sold not long ago for \$8,000. In one trip alone this same "tub" is said to have cleared \$12,000 profit! An iron sailing vessel that cost \$25,000 is said to have made \$35,000 on its first trip across the Atlantic. Old "salts" who have been living on shore for many years have again donned their oilskins. A boot and shoe merchant, who had not sailed a ship for twenty years, sold his store, bought an interest in a brig, skippered it himself across the Atlantic, and cleared up \$3,000 in a month. No more boot selling for him, he declares. The Atlantic is an interesting highway these war days!



Vibration is the chronic enemy of machinery, so seek to guard against it in every practical way.

#### CANADIAN SHIPBUILDING IN 1914.

ACCORDING to the list of vessels built and registered in Canada as issued by the Department of Marine and Fisheries, 1914 was a fairly active year in ship construction. In the '70's of last century, when the wooden sailing ship was still the glory of the seas and a main carrier of ocean-borne commerce, the measurement of vessels turned out of Canadian yards ran up towards 200,000 tons a year.

The steel tramp that on a low consumption of coal could push its way through the water at a speed of eight miles an hour or so was getting its start, however. It was better adapted to the needs of a growing commerce, and if on the ocean highway it could not keep up with the fine clippers and great three and four-masted sailers, it had other advantages which made it the fittest, and its old-type competitor could not survive. From 1874, when 190,756 tons was added to the registry, there was a gradual decline till 1896, when the additions to the list only measured 16,146 tons.

When the development of trade on the Great Lakes began to call for a larger class of steamers than had heretofore been employed, Ontario began to advance as a ship-owning and ship-building province, and has of late years been the chief contributor to the record. Last year the measurement of the new vessels was 43,346 tons, the largest figure in fourteen years; and of the whole, 23,167 tons was credited to Ontario.

The increase in the total of vessels registered was, however, only 35,457 tons, there being a reduction on account of the loss, sale or breaking up of older craft. According to the record the number and tonnage of vessels registered in Canada at the close of 1914 was as follows:

	Vessels.	Tons.
Ontario ... ..	2,100	314,660
Quebec ... ..	1,663	259,143
British Columbia ... ..	1,591	147,192
Nova Scotia ... ..	2,098	135,053
New Brunswick ... ..	1,052	55,522
P. E. Island ... ..	149	10,029
Manitoba ... ..	103	7,999
Yukon ... ..	11	2,295
Saskatchewan ... ..	5	529
Total ... ..	8,772	932,422

The average size of the registered vessels, it will be noted, is just over 100 tons. There are ships of large capacity on the list; but the majority are schooners or fishing barges, and even smaller craft, that some countries do not enter on their records of ships. They all serve a useful purpose, however, and play their part in the work of transportation of one kind or other.



## Trade Gossip

**The Collingwood Shipbuilding Co.,** Collingwood, Ont., have closed a contract with the Imperial Oil Co., for a steel tank steamer of the same type as the one now under construction for the same concern.

**Toronto, Ont.**—Delivery of the machine guns which Ontario is supplying to the Canadian forces at the front will begin October 30, when ten will be put in the hands of the militia department. More will be delivered weekly till December 18, when the last 130 of the 500 are due from the contractors.

**Conditions Better in Steel Business.**—Conditions are better than for the past three years, said J. H. Plummer, president of the Dominion Steel Corporation, who was in Montreal recently. He also said that many of the difficulties to which he referred at the annual meeting, and being overcome, there

was still some slight difficulty in securing tonnage to England.

**Hydrographic and Biological Survey.**—The Marine Biological vessel, the Prince, has left to continue hydrographic work in the Bay of Fundy. The party consists of Dr. Cox and Messrs. Craigie, Chase and McMurich, and will be gone about a fortnight. They will proceed to St. John, run a line of stations to Digby; thence up Annapolis Basin to Annapolis. Returning, they will run another line from Quaco to the Nova Scotia coast opposite; besides working a few midway the Bay on the return trip.

**Make German Dyes Here.**—Two Canadian companies are grasping the opportunity offered by the failure of German concerns to furnish dye stuffs to America. The last issue of the Quebec official gazette, announced the incorporation of the two new companies that will produce the dye stuffs. The German

Dye Works, Ltd., of Montreal, is empowered to carry on the business of dyers and are also empowered to produce all necessary products for their industry. The Weedon Chemical Co., among its powers, has been given that of distilling wood and producing all sorts of chemical products.

**Newfoundland Buys Guns.**—The Newfoundland regiment has already two machine guns, the gift of Mr. William Duff Reid, president of the Reid Railway concern. Sir Edgar Bowring, president of the Bowring Bros. Steamship Co. has announced the gift of two machine guns from his company. The employees of Harmsworth Paper Mills at Grand Falls, in the interior of Newfoundland, will provide two more machine guns, and the employees of the Dominion and Nova Scotia Steel Co.'s mines at Wabana are each pledged for one thousand dollars, which will be devoted to machine guns also.

## CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

### CANADIAN TRADE COMMISSIONERS.

#### Argentine Republic.

H. R. Ponssette, 278 Balcarce, Buenos Aires. Cable Address, Canadian.

#### Australasia.

D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.

#### British West Indies.

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

#### China.

J. W. Ross, 6 Kiukiang Road, Shanghai. Cable Address, Canadian.

#### Cuba.

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

#### France.

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

#### Japan.

G. B. Johnson, P.O. Box 109, Yokohama. Cable Address, Canadian.

#### Holland.

J. T. Lithgow, Zuiddlaak, 26, Rotterdam. Cable address, Watermill.

#### Newfoundland.

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

#### New Zealand.

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

#### South Africa.

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

#### United Kingdom.

E. de B. Arnaud, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

Acting Trade Commissioner, North British Building East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

Fred Dane, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

### CANADIAN COMMERCIAL AGENTS.

#### British West Indies.

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

#### Colombia.

A. E. Beckwith, c-o Tracey Hmos, Medellin, Colombia. Cables to Marmato, Colombia. Cable address, Canadian.

#### Norway and Denmark.

C. E. Sontum, Grubbeged No. 4, Christiania, Norway. Cable address, Sontums.

#### South Africa.

D. M. McKibbin, Parker, Wood & Co., Buildings, P.O. Box 559, Johannesburg.

E. J. Wilkinson, Durban, 41 St. Andrew's Buildings, Durban, Natal.

### CANADIAN HIGH COMMISSIONER'S OFFICE.

#### United Kingdom.

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.



# INDUSTRIAL <sup>AND</sup> CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News.

## Engineering

**Niagara Falls, Ont.**—Fire did \$1,000 damage to the melting room of the Polard Mfg. Co. foundry.

**Toronto, Ont.**—The Canada Metal Co. are making extensions to their factory at a cost of \$15,000.

**St. Catharines, Ont.**—The McKinnon Dash & Metal Works will start the construction of an addition.

**Calgary, Alta.**—The Canadian Pacific Railway is increasing its shell-making facilities at the shops here.

**Welland, Ont.**—The Canadian Billings & Spencer Co. will purchase forge and metal-working machinery to cost \$30,000.

**Truro, N.S.**—The Truro Engineering Co. will install \$27,000 worth of machinery in its plant for the manufacture of shells.

**Port Arthur, Ont.**—The Western Dry Dock & Shipbuilding Co. has received a new order for a large number of high explosive eighteen-pound shells.

**Calgary, Alta.**—DuCane, Dutcher & Co., consulting engineers, of Vancouver, B.C., are working on a hydro-electric power project on the Elbow river near here.

**St. Thomas, Ont.**—The St. Thomas Construction Co., who have taken over the Steel Vault Co. plant in order to make shells, are in the market for machinery for this purpose.

**Montreal, Que.**—The Aetna Chemical Co., will build a plant at Drummondville, Que. The general contract has been awarded to the Westinghouse, Church, Kerr & Co., Montreal.

**Toronto, Ont.**—A building permit has been issued to the Polson Iron Works for the erection of a one-storey frame and metal addition to their factory on the Esplanade, costing \$3,000.

**St. Catharines, Ont.**—Work will be started at once on the construction of an addition to the factory of the Whitman & Barnes Mfg. Co. The new structure will enlarge the forge room to double its present size.

**Stratford, Ont.**—R. C. Bartlett has secured the Morelock factory building and will install machinery and equipment

for the manufacture of automobiles. Mr. Bartlett has been manufacturing automobiles in Toronto, Ont., for some time.

**Hamilton, Ont.**—The Canadian Cart-ridge Co. will spend \$150,000 on machinery to be installed in its plant which is being erected here. A main building, to cost \$30,000, and a boiler house and machine shop will be constructed first. The total investment will be \$250,000.

**Ford, Ont.**—Work on another new addition to the plant of the Ford Motor Co., at an estimated cost of \$60,000, has been started. It will extend for 705 feet along the Detroit River frontage. The building will be one storey high, of concrete with a steel "saw tooth" roof. It will be devoted entirely to machine shop work.

**Quebec, Que.**—G. B. Mitchell, of Montreal, has just been granted a sub-contract by M. P. & J. T. Davis, the contractors of the Lauzon Dry Dock, for the construction of the new power house for the latter. The power house will be 120 x 100 feet, of brick and steel. The smoke stack will be of brick, 180 feet high, 20 feet in circumference at the base and 14 feet at the top. The pump house will be 50 x 70 feet.

## Electrical

**Blenheim, Ont.**—Work will start shortly on the construction of the sub-station in connection with the hydro-electric system.

## Municipal

**Colborne, Ont.**—The town council will buy a fire engine. The by-law has passed.

**Melfort, Ont.**—The town will spend \$2,500 on extensions to the telephone system.

**Matheson, Ont.**—The town will spend \$20,000 on the construction of a waterworks system.

**Outremont, Que.**—The City Council have decided to buy a combined sprinkler and flushing machine.

**Palmerston, Ont.**—A by-law providing for the installation of a hydro-electric

system will be submitted to the rate-payers on August 7th.

**Meaford, Ont.**—A by-law will be voted on by the ratepayers on Aug. 16 to authorize the expenditure of \$4,000 on waterworks extensions.

**Milverton, Ont.**—By a majority of 155—only seven ratepayers voting against the measure—Milverton carried a hydro-electric by-law on July 30.

**Carlyle, Sask.**—A by-law will be voted on by the ratepayers on Aug. 9 for the purpose of raising \$3,000 to complete the civic power plant.

**Lennoxville, Que.**—A by-law has been passed authorizing the purchase of the waterworks, and the expenditure of \$14,000 on repairs and extensions.

**London, Ont.**—It is proposed to spend \$62,000 on electric light plant and \$30,000 on waterworks extensions. A by-law will be submitted to the ratepayers.

**Markham, Ont.**—It is estimated that the proposed extensions to the waterworks system will cost \$15,000. E. A. James, Adelaide street, Toronto, is the engineer.

**Montreal, Que.**—It is expected that a retaining wall will have to be built to protect the aqueduct. The length of wall will be about seven miles and the cost approximately one million dollars.

**Brockville, Ont.**—Dr. McCullough, chief medical officer of health for Ontario, has written the chairman of the Board of Water and Light Commission approving of the location of the proposed new intake pipe at the pumping station. To ensure a pure water supply, Dr. McCullough insists upon the installation of a filtration plant.

## General Industrial

**Galt, Ont.**—Getty & Scott, Ltd., propose making an extension to their factory.

**Calgary, Alta.**—The Southern Alberta Refineries, Ltd., will establish a refinery near here.

**Louisburgh, N. S.**—The Marconi Wireless Telegraph Co. will make extensive alterations and additions to its plant.

**Chatham, N. B.**—The Miramichi pulp mill of the Dominion Pulp Co was de-



stroyed by fire recently with a loss of \$50,000.

**Calgary, Alta.**—The Western Canada Flour Mills Co. have started construction work on five of its ten new elevator plants to be built at once in Alberta. The five points at which work is now progressing are, Ensign, Kircaldy, Champion, Dalmead and Street, Alberta, and five more points, yet to be chosen, will each get one of the new elevators. The new elevators will be built at a cost of \$75,000.

## Tenders

**Regina, Sask.**—Tenders will be received by the City Commissioners up till Monday, September 6th, 1915, for the supply, delivery and erection of a 7,000,000 gallon pumping unit at the city power house. Specifications and other information may be obtained from J. M. MacKay, Superintendent of waterworks, Regina, Sask.

## Contracts Awarded

**Strathroy, Ont.**—The Nicholson Planning Mills have received an order for shell boxes.

**Lachine, Que.**—The city council has awarded the contracts for the supply of cast-iron water pipe to the Dominion Bridge Co.

**Windsor, Ont.**—The city council awarded the contract for the supply of cast iron water pipe to the National Iron Works, Ltd., Toronto, at \$30.25 per ton, and for specials, valves, hydrants, etc., to the Kerr Engine Works, Walkerville, Ont.

## Building Notes

**Barrie, Ont.**—Work will commence at once on a new \$15,000 Carnegie Library.

**Toronto, Ont.**—The city architect's department has issued a building permit to Gunn's Limited for the erection of a two-storey corrugated iron warehouse, costing \$6,000, on Symes road, near Scarlett road.

**Toronto, Ont.**—A building permit was this morning issued to the Dunlop Tire & Rubber Goods Co., for the erection on Booth avenue near Queen street of a three-storey brick addition to their factory costing \$30,000.

## Railways-Bridges

**Toronto, Ont.**—Plans for the construction of the new pedestrian subway under

the tracks at Ashdale Avenue will shortly be submitted to the Dominion Railway Board for approval. The estimated cost is \$11,500.

**Fredericton, N.B.**—Premier Clarke has announced that borings would be made for the proposed bridge crossing for the St. John Valley Railway at Gorham's Bluff, near the Mistake. This work is to start as soon as arrangements can be made to have the drilling outfit taken to Gorham's Bluff and will be rushed to completion. Premier Clarke stated that this course had been finally decided upon by the government.

## Wood-Working

**Martintown, Ont.**—A. D. Clinger's sawmill has been destroyed by fire. The loss is estimated at \$8,000.

**Ditchfield, Que.**—Fire recently destroyed the saw mill belonging to P. H. Renaud. Loss is estimated at \$6,000, which is covered by insurance.

## Marine

**Kingston, Ont.**—Navigation on the Rideau is practically at a standstill. All season the steamer Rideau Queen has been unable to proceed as far as Smith's Falls, owing to low water. On July 27, the steamer was taken off the route entirely. Lately she has been able to go only as far as Portland.

**S.S. Parima Damaged.**—The freighter Parima, of the Quebec Steamship Co., was damaged by fire on July 29, at Hoboken, N.J., where the ship was undergoing repairs. The fire is believed to have started in a pile of rubbish collected for removal. An investigation is being made to determine whether the blaze was of accidental or incendiary origin.

## Refrigeration

**Ingersoll, Ont.**—A large cold storage plant and tin shop will be constructed by the Borden Milk Co.

## Personal

**J. T. Breckon**, waterworks engineer for the city of Vancouver, B.C., has resigned.

**R. H. Parsons**, superintendent of the municipal power plant at Edmonton, Alta., has resigned.

**M. S. Gibson** has been appointed general manager of the National Fireproof-

ing Co. of Canada, Ltd., with headquarters at Toronto.

**Hon. Jean Provost**, ex-Premier of Colonization, Mines and Fisheries in the Gouin Government, and member of the Legislature for Terrebonne, died at Quebec on July 26, in his forty-sixth year.

**M. J. Butler, C.M.G.**, of Armstrong, Whitworth of Canada, Ltd., is to be appointed consulting engineer of the Montreal city waterworks, which will include the construction of the filtration plant and the widening of the aqueduct.

**Joseph R. Henderson**, of Montreal, president and general manager of Brandram-Henderson, Ltd., Montreal and Halifax, manufacturers of paints, etc., died suddenly in Halifax on July 31. He was born in Hexham, Northumberland, England, in August, 1851. He will be buried in Halifax.

## Trade Gossip

**Vancouver, B.C.**—It is reported that the plant of the Ocean Falls Co. will be re-opened.

**The Cedars Rapids Manufacturing & Power Co.**, have under consideration adding 10,000 to 30,000 horse power to the capacity of the plant.


**The General Car & Machinery Works, Ltd.**, of Montmagny, P.Q., makers of road machinery, have opened an office at 317 St. James street, Montreal, under the management of J. H. Langis.

**Canadian Shipping.**—During 1914 there were constructed in Canada 43,346 tons of new shipping, which at \$30 per ton, as a fair average value, makes the total value of vessels entered on the Canadian registry \$27,972,000. The tonnage constructed in 1914 is the largest annual output of the Dominion in 15 years.

**Scarcity of Coal Freighters.**—The Sydney Record says that owing to scarcity of ships, it understands that negotiations are in progress between the Dominion Coal Co. and the Intercolonial Railway for the shipment of a large tonnage of coal from Sydney to Quebec and Montreal by rail. Owing to a quietness in freight business, it is considered possible an arrangement will be concluded at a tariff profitable to the railway and satisfactory to the Coal Co.

**Aetna Explosives Co.**—The big plant of the Aetna Explosives Company, upon which operations are being rushed at Drummondville, Que., will stand as one of the important industries which the war business has brought to Canada. A subsidiary of the Aetna Explosives Co. of the United States, it will be backed entirely by American capital, but the




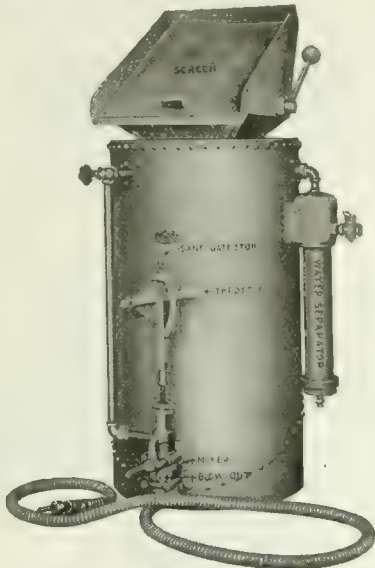


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*Canada's Leading Machinery House*





## Two Notable Labor-Saving Devices for Increasing Production

### CURTIS SAND BLASTS

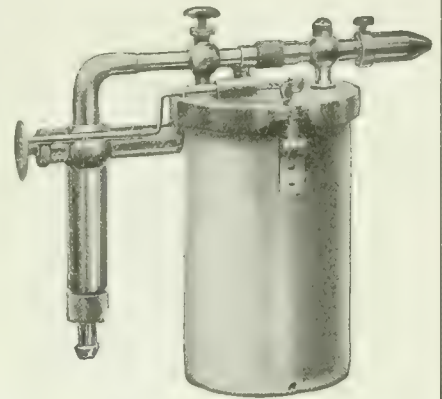
Have maximum abrasive action and embody many features that save time and labor not included in the design of other makes. For cleaning scale from ship's hulls and preparing the interior of high explosives for varnishing.

Get information on the CURTIS JACK for handling hollow forgings for external or internal sand-blasting.

### THE ECLIPSE AIR BRUSH

For applying varnish to the interior of high explosives or painting the exterior, the Eclipse is unrivalled in the economy of material and time and labor-saving efficiency.

Get information on special motor-driven rotating stand for handling this work on a quantity basis.



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**THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED**  
Machine Tool Department

HANG THIS UP

There is a Geometric Die Head on every make of screw machine engaged in thread cutting.

Some day we will ask you to strike out the word "make," for it is our purpose to put a Geometric Die Head on every screw machine engaged in thread cutting.

Every condition fosters this expectation:—

Die Heads that are indispensable to those who have used them.

Expert workmen.

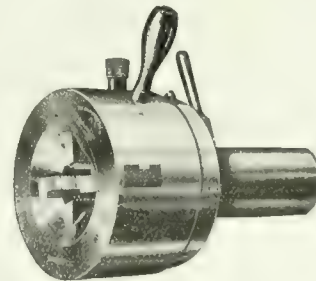
Business integrity.

A reputation that is sound.

A strong faith in The Geometric Tool Company, its products and its customers.

## DO YOU KNOW WHAT GEOMETRIC SATISFAC- TION IS?

You probably do not know how satisfied you can be with your Screw Threading Operations unless you know what Geometric Satisfaction is.



Ask us about it in connection with your requirements.

**THE GEOMETRIC TOOL  
CO., NEW HAVEN, CONN., U. S. A.**

Canadian Agents:—Williams & Wilson, Ltd., Montreal; The  
A. R. Williams Mch. Co., Ltd., Toronto,  
Winnipeg, St. John, N.B.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



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CHICAGO ILLINOIS

New and second-hand machine tools in stock for immediate delivery:

### LATHES

- 18" (20" swing) x 8' Hamilton, C.R. H.S. (Used).  
 18' x 10' Rahn Carpenter, C.R. H.S. (Used).  
 21' x 10' Bradford, C.R. H.S. (Used).  
 22' x 12' Flather, C.R. H.S. (Used).  
 24' x 8' Putnam (Used).  
 24' x 8' Sherman (Used).  
 25' x 14' LeBlond, heavy duty (New).  
 30' x 14' American (Used).  
 36' x 12' Schumacher & Boye (Used).  
 36' x 16' Fifield (Used).

### TURRET LATHES and SCREW MACHINES

- Two 24" Morse Turret Lathes, with 1" hex. turret, on carriage (Used).  
 No. 5 Bardons & Oliver (2") with wire feed, oil pump and pan (Used).  
 Two Bardons & Oliver No. 2 Hand Screw Machines, plain head, (1") wire feed, oil pump and pan (Used).

### PLANERS

- 30" x 30" x 8' Flather, one head (Used).  
 36" x 36" x 8' American, two heads (Used).  
 36" x 36" x 15' Woodward & Powell Frog and Switch, two heads (Used).

### SHAPERS

- 20" Gould & Eberhardt, back-gear, crank (Used).  
 16" Stockbridge crank (Used).  
 14" Acme, crank (Used).

### DRILL PRESSES

- 21" Cincinnati, B.G. and power feed (Used).  
 21" Hofer, b.g. power feed (Used).  
 22½" Barnes, b.g. power feed (Used).  
 24" Cincinnati, sliding head, complete (Used).  
 26" Sibley & Ware, sliding head, complete (Used).  
 28" Barnes, sliding head, complete.  
 28" Sibley & Ware, sliding head, complete (Used).  
 31" Barnes, sliding head, complete (Used).  
 4½" Bickford Plain Radial (Used).  
 5' Prentice Plain Radial (Used).

### MILLING MACHINES

- No. 2 Brown & Sharpe, plain (Used).  
 No. 2 Kempsmith, plain (Used).  
 No. 2-H Brown & Sharpe, plain (Used).  
 No. 3 Pratt & Whitney, plain (Used).  
 No. 3 Kempsmith, plain (Used).  
 No. 3 Cincinnati, plain (Used).  
 No. 3 Newton, plain (Used).  
 No. 3 Owen, Universal (Used).

### MISCELLANEOUS

- No. 22 Espen-Lucas Cold Saw, capacity 6" (Used).  
 No. 15 Lea Simplex Cold Saw, capacity 5" (Used).  
 42" Colburn Boring Mill, 2 heads (Used).  
 42" Bullard Boring Mill, 2 heads (Used).  
 30" Bullard Boring Mill, one turret head (Used).  
 1½" Acme Bolt Cutter (Used).  
 2½" Acme Bolt Cutter (Used).

business for the time being at least will be the outcome of the big contract which the company secured from the Canadian Car & Foundry Co. to supply explosives in connection with the Russian shell order. The company has secured a big site outside the town of Drummondville, and the plant will probably cost \$500,000 and employ a large number of hands. The operation of the works is expected to commence in the course of a few months to fill contracts this fall.

## Catalogues

The Universal Iron & Supply Co., St. Louis, Mo., have issued a leaflet giving particulars of storage tanks with sketches of various types. An interesting feature is a calibration curve for horizontal cylindrical tanks of any dimensions.

The Providence Engineering Works, Providence, R.I., have mailed a bulletin describing the "Providence" shaper which they are putting on the market. The essential features incorporated in the design of this machine are dealt with, and a brief specification is included giving the principal dimensions. Two illustrations give a general idea of the style of machine.

The Sunbeam Index to the proper lighting of homes is the title of a bulletin issued by the Canadian General Electric Co., Toronto. The bulletin contains much useful information on the illumination of the various parts of a house accompanied by a table on the selection of the right lamp. Another table gives the cost of electricity for the various electrical devices used around the home.

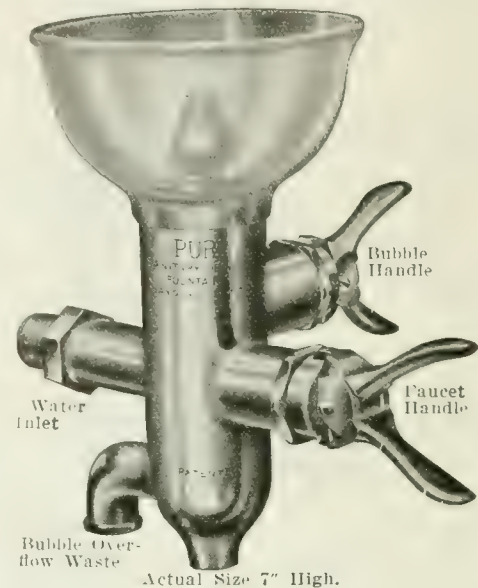
**Pulleys**—The Oneida Steel Pulley Co., Oneida, N.Y., have issued a new general catalogue No. 5 dealing with a complete line of pulleys of both steel and wood construction. The principal features embodied in the design of these pulleys are described in detail with explanatory illustrations. Price lists are included and also tables giving weights of stock sizes and a telegraph code. The catalogue concludes with a number of mechanical tables.

**Electric Furnaces** made by the Canadian Hoskins, Ltd., Walkerville, Ont., are described in bulletin No. 12. Full particulars are given covering the construction, temperatures, operation and uses of furnaces, together with dimensions and price of each size. Other lines dealt with include thermo-electric pyrometers, portable and wall meters, etc. Inserted leaflets illustrate and describe the "Stewart" combination furnace.

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Here is a practical Fountain, which combines the Faucet and Bubble Features—takes care of the overflow waste, and insures

## Safety and Service

This is an age of sanitary plumbing and the Sanitary Drinking Fountain is one of its important subdivisions.

**SAFETY FIRST PURO SERVICE ALWAYS**

It is made of heavy brass with extra heavy nickel plate. Bubbler easily controlled by separate "squeeze" handle. No spurts—no choking—inside regulation prevents "showerbath." Faucet is controlled by another squeeze handle. Faucet gives full water pressure. Has thread for hose if wanted.

Write us the number of your employees and water pressure and we'll present an interesting proposition to you promptly.

**Puro Sanitary Drinking Fountain Company**

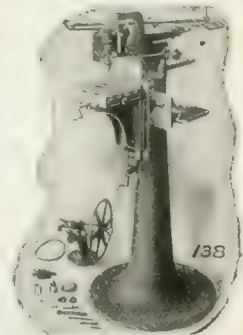
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It doesn't take an expert to operate the GORTON ENGRAVING MACHINE. The ordinary workman can turn out lettering or designs either sunk or in relief, on dies, moulds, tools, patterns, core boxes, label plates, instruments, etc., etc., better than the most skilled hand engraver in the fraction of time the hand workman would take.

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RACINE, WIS.





Why go to the expense of  
buying new machines for the  
manufacture of

## SHELLS?

We have already shipped some 75 car-  
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# Rebuilt Machine Tools

to CANADA since the outbreak of  
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If you need any equipment it will be to  
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as our facilities for furnishing rebuilt  
machinery are second to none on the con-  
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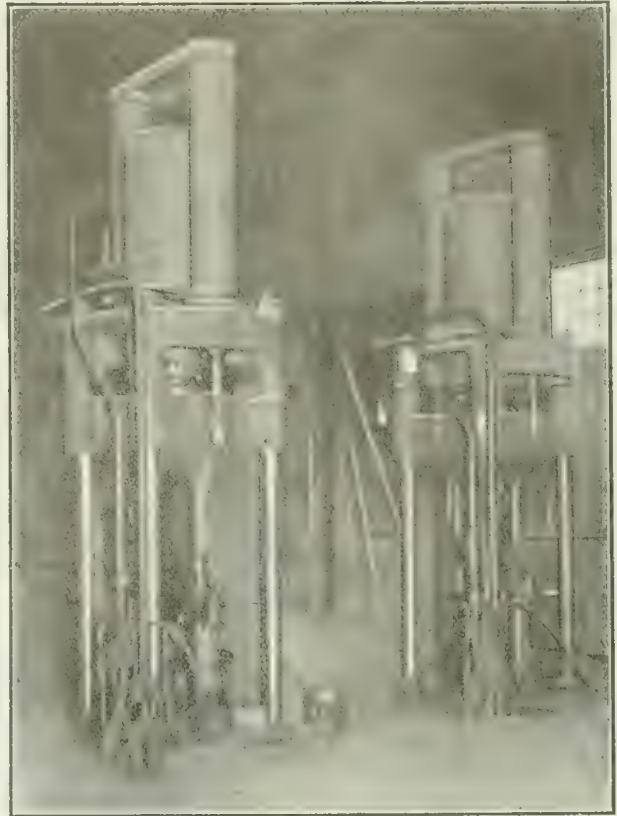
EVERY MACHINE WE BUY IS PUT  
THROUGH OUR OWN SHOPS AND  
COMES OUT IN ABSOLUTELY PER-  
FECT ORDER—AND WE STAND  
BEHIND EVERY ONE WE SELL.

The demand is enormous, but we are not  
taking advantage of the war by putting  
on exorbitant prices. Our aim is a good,  
square deal to everybody all the time.  
You can often get something practically  
equal to a new machine at a very great  
saving in price.

As we carry a large stock, we can likely  
supply you from stock, or if we cannot  
do this, we will take your order for fu-  
ture delivery, specifying a definite time  
when we will supply you with such tools  
as you may require.

**New York Machinery Exchange**  
50 Church St., New York

## DRAWING PRESSES



# HYDRAULIC PRESSES

For Piercing and Drawing

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Our facilities for manufacturing  
Hydraulic Presses assure you a  
product of very high quality and  
efficiency at reasonable cost.

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LIVERY.

**The William Cramp & Sons Ship  
and Engine Building Company**  
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# METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

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Fellow Surveyors' Institute, London, England.  
47 Central Chambers, Elgin Street,  
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In all countries. Ask for our Inventor's Adviser, which will be sent free.

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**Morton Manufacturing Co.**  
Draw Cut Shapers, Special Draw Cut R.R. Shapers, Special Locomotive Cylinder Planers, Portable Planers, Stationary & Portable Key Way Gutters, Finished Machine Keys.  
Office & Works, Muskegon Heights, U.S.A.

gas and oil furnaces and a recalcrescent outfit. The catalogue is fully illustrated.

**Power Transmission Appliances.** — The "Keystone" line of improved appliances for power transmission is the subject of introductory bulletin K2 issued by the Keystone Pulley Co., Oneida, N.Y. The line dealt with in this bulletin consists principally of various types of shaft hangers and pillow blocks, but safety set collars, flange and clutch couplings are also included. The principal features of these products are clearly explained accompanied by illustrations and diagrams. Several tables give dimensions and prices for each size.

The Gisholt Machine Co., Madison, Wis., have sent us a copy of their new catalogue K3 describing the "Gisholt Universal Tool Grinder." The catalogue contains a matter of 32 pages and is gotten up in an attractive style. The opening pages deal with the advantages to be gained by using this machine. Following are three or four pages devoted to tool grinding by the "Gisholt" method including a number of settings for grinding the different cutters, illustrated. Pages 16 and 18 deal respectively with grinding inserted tool, post tools and the correct forging of tools. Pages 20 and 21 give the principal dimensions and weights and also a list of parts, illustrated, of the tool grinder. Pages 22 to 26 inclusive contain a general description of the machine together with cross sections and a floor plan. The succeeding pages deal briefly with turret lathes and boring mills, and conclude with a map showing the location of Madison accompanied by an invitation to visit that city. The illustrations are exceptionally good and include views of tool rooms, two grinding charts, a sample of tools ground on this grinder, in addition to those already referred to.

## Book Reviews

**Submarines, Torpedoes, and Mines**, by W. E. Dommett, 106 pages 7¼ inches, 21 illustrations and 16 full size plates. Published by Whittaker & Co., London, and New York, price 25c net. This is the second impression of an exceedingly interesting little volume, especially so at the present time when the work of submarines is so much before the public. The author states that in the preparation of this book, the endeavor has been to present the subject in such a manner that it shall be understood by, and together with the plates, be of interest to the general reader, and at the same time contain sufficient technical matter to be of value to the reader having some technical knowledge. The latter feature, however is limited to some extent by the necessity for secrecy enjoined by the various governments or private yards building submarines. That

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We always carry a large stock of machine tools for general manufacturing purposes, and solicit inquiries requiring prompt delivery.

We call attention to the following, on which we will quote attractive prices. All in thoroughly first-class condition:

- Three 36" Fellows Gear Shapers.
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- One 30" throat Putnam heavy punch and shear, capacity 1" hole in 1" plate.
- One 72" King vertical boring mill with two heads.
- One 48" Bement car wheel borer with crane.
- One 38" Baush vertical boring mill, two heads.
- One 39" Niles vertical boring mill, two heads.
- Two 36" Snyder upright drills, power feed, etc.
- Two 5' Bickford radial drills.

**Girard Machine and Tool Co.**

491-493 N. Third Street, Philadelphia, Pa.

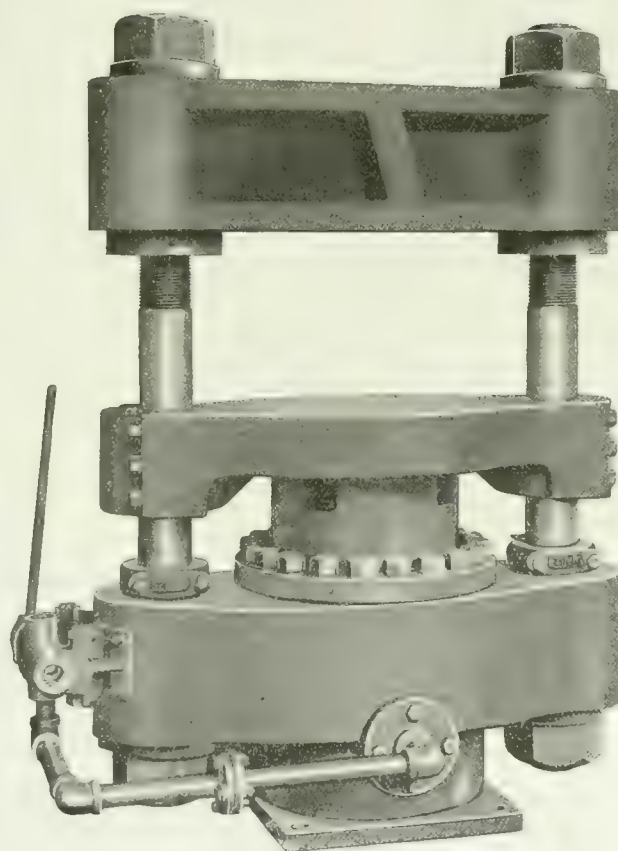


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Pumps  
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Full specifications and quotations upon request.

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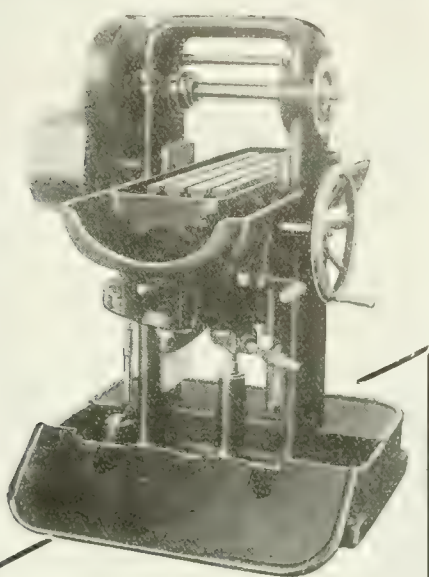
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## Classified Advertisements

† Those who wish to sell or buy a business, obtain competent help, connect with satisfactory positions or secure aid in starting new enterprises, should not fail to use the Want Ad. Page of "CANADIAN MACHINERY."

**WANTED. EQUIPMENT FOR MACHINE (repair) shop; weight or accuracy not important as price. Give full details. Box 153, Canadian Machinery (8).**



### Briggs High Duty Milling Machine—

Special "Arch Design" supports the cutter from all sides, and allows for

#### VERY HEAVY CUTS AND FASTER FEEDING,

greatly reduces vibration and assures positive alignment.

A Briggs Miller does the work no other machine can touch—it's a 20th century milling machine in every particular—it's one way to save money.

Drop a line for full details.

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**A WANT AD. IN THIS PAPER  
WILL BRING REPLIES FROM ALL  
PARTS OF CANADA.**

the book is up to date is proved by the reference to incidents of the present war; viz., the action at Heligoland Bight and the feat of the B. 11 in penetrating the Dardanelles and torpedoing a Turkish warship. The book contains ten chapters with the following headings:—Historical, British naval submarines, submarine tactics, steering and manoeuvring apparatus, propelling plant, armament, navigation fittings, routine on submarines, mines, and lastly auxiliary vessels. It will be noted from the above that submarines and their constructions have been covered quite comprehensively. The plates sixteen in number, are excellent reproductions and show various types of submarine craft, while twenty-one illustrations show the propelling engines and other details. Among the latter is included a folding plate illustrating the interior of a submarine. The chapters on torpedoes and mines are also equally interesting, the illustrations being of considerable help to a clear understanding of the text.



#### HASTE AND WASTE.

IT is hurry in the morning, hurry at noon-time, and hurry at night. Nervous bodies, wrought up to a certain speed, fret away pleasure and good nature just to keep up the pace. Relaxation becomes almost painful—rest a farce. To be in any measure content one feels it necessary to be rushing along "break-neck." No more is accomplished, homes are not the brighter, children the happier, or lives made more useful by all this rush. Yet we keep it up.

One has only to watch the crowds in the cities going to trains or cars to see the working out of the speed mania. Rights of others are forgotten, personal safety seems naught, just crowd, push and get ahead. Strange to say, however, we do not get ahead as quickly as we would if we were to move in a more leisurely manner.

Haste makes waste, and waste is expensive in the extreme. Some persons are too busy to attend to that which insures themselves good health. They expect to mend a broken auto tire hastily and with no skill.

This is an impossibility, but that is not taken into consideration; and so the haste and waste go on, and every day comparatively young men and women let slip from their hands all that is useful and happy in life. Their grasp has grown weak and nothing can be held longer. All due to the daily rush of eating, of working, of walking—everything done hastily, with only a thought for saving an hour or two. Think it over!—Todge Idea.

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13" x 5' Pratt & Whitney Lathe, R. & F. Rest.  
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16" x 8' Prentice, C.R.  
18-36" x 8' Fay & Scott Extension Gap.  
20" x 10' Porter, C.R.  
28" x 12' Fidelity, C.R.

### TURRET LATHE AND SCREW MACHINES.

2 x 24 Jones & Lamson, Bar and Chucking outfits.  
2 x 24 Jones & Lamson Turret Lathe.  
28" Pond Rigid Turret Lathe, 4" hole in spindle.  
28" Fay & Scott Turret Lathe, 4-step cone.  
30" Heavy Turret Lathe, 3-step cone for 3 3/4" belt.  
30" Lodge & Shipley Heavy Turret Lathe.  
26" Draper Turret Lathe, 4" hole in spindle.  
No. 3 Pearson Screw Machine.  
2 1/4" Pearson Screw Machine.  
No. 2 1/2 Pratt & Whitney Screw Machine.  
2" Bardons & Oliver Screw Machine.  
No. 00 Brown & Sharpe Automatic Screw Machines (4).  
No. 1 Brown & Sharpe Automatic Screw Machine.  
No. 2 Brown & Sharpe Automatic Screw Machine.  
5 1/2" Cleveland Auto. Screw Machines (2).  
2" Cleveland Auto. Screw Machines (2).

### MILLING MACHINES.

Whitney Hand Millers (13).

Above, partial list only.

**A.D. White Machinery Co.**  
108-114 N. Jefferson St., CHICAGO

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If you want a buyer for your business, or have a situation to fill or want a situation, send us a Condensed Advertisement. There is someone who is looking for a proposition such as yours. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

**Try it out.**



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Are Good Grinders



WITH  
THE  
PRICE  
GROUND  
DOWN

Popular for garage, shop or factory. Thousands of Canadian shops engaged in the manufacture of shrapnel shells will find splendid use for this tool for grinding their tool bits, drills, hand tools, lathe tools, etc.

We want to place at least one of these grinders in every shop in Canada where good work at a low cost is wanted.

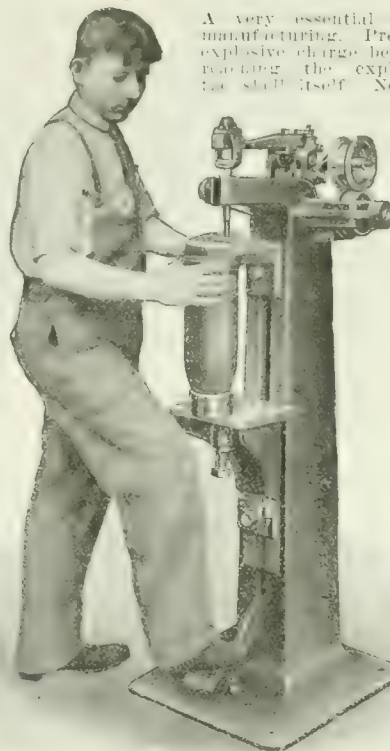
ARE YOU ONE OF  
THESE SHOPS?

Manufactured by

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Good Canadian Agents Wanted  
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## Riveting Base of Explosive Projectile



A very essential operation in shell manufacturing. Prevents gas from the explosive charge behind the shell from reaching the explosive contents of the shell itself. Neglect of this operation would probably cause the shell to explode and kill or injure the gun crew.

After the shell is in position the machine is started and the shell is rotated one complete revolution by hand and with the machine striking about 200 blows per minute. The plug can be riveted perfectly tight into the base in about 10 seconds.

CHANGE OF  
FIXTURE, EN-  
ABLES MACHINE  
TO BE ADAPTED  
FOR 45", 8 LBS.  
OR SHELLS  
EVEN LARGER  
THAN 45"

Drop a line for  
further particu-  
lars.

**The Grant  
Mfg. &  
Machine Co.**  
Bridgeport, Conn.

## LATHES AND TURRET LATHES IN STOCK.

2-10" x 4' South Bend.  
1-11" x 4' Monarch.  
1-12" x 6' Blaisdell.  
1-14" x 6' Wright & Smith.  
1-14" x 10' LeBlond.  
1-15" x 6' Kelly.  
1-15" x 6' Johnson.  
1-15" x 12' Carroll.  
1-15" x 8' Kelly.  
1-18" x 10' Lidge & Davis, rod feed.  
1-20" x 14' Sellers.  
2-22" x 10' Pond.  
1-24" x 40" x 14" McCabe, double spindle.  
1-26" x 13' Bement.  
1-26" x 17' Johnson.  
1-27" x 22' Pratt & Whitney.  
1-28" x 14' Fifield.  
1-30" x 18" Bement.  
1-33" x 12" Gap, swings 55" when open.  
1-50" x 16" Pittsburgh Machine Tool Co., blocked to 62".  
1-50" x 27" New Haven.  
1-54" x 30" Bement.

### TURRET LATHES

2-1" Bards & Oliver, automatic chucks.  
1-11" Bards & Oliver wire feed screw machine.  
No. 2 Pratt & Whitney wire feed screw machine.  
12" x 6'6" Warner & Swasey double head key lathe.  
14" x 4' Dresser lathe, with cut-off slide.  
2-14" x 5' Warner & Swasey lathe.  
15" x 5' Johnson turret lathe.  
16" x 5' Windsor turret lathe, with cut-off slide.  
22" x 8' Ames.  
40" Couardson turret lathe, 3/4" hollow spindle.

**FRANK TOOMEY, Inc.**  
127-131 N. Third St., Philadelphia, Pa.

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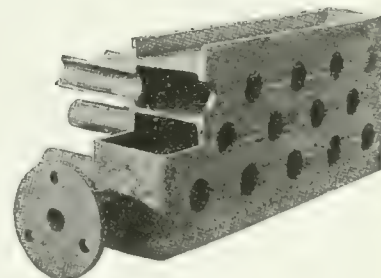
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and show you what can  
be done by the

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No Shop, Foundry, Shipyard, Manufacture, Mill, Mine, Garage  
should be without it. A Money Saver. A Money Maker.

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Goods.



Apparatus made of I-Beams welded, to stand high pressure

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EVERYTHING in the OXY-ACETYLENE LINE,  
We manufacture the MOST EFFICIENT OXYGEN, -by  
Claude's LIQUID AIR PROCESS.

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The Foundry and Machine Exhibition  
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The greatest display of labor-saving machinery and plant equipment ever staged in the world's history. Think about it. Talk about it—Then come. Prepare for a big event and you won't be disappointed.

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1949 West Madison Street, CHICAGO, ILL.

**Ground to a Perfect Finish in 20 Minutes**

The large cast iron rolls, running up to 50 inches in diameter, which constitute an important part of carding machines, are ground with Norton Alundum Wheels in the Saco-Lowell Mills at Newton Upper Falls, Mass. The time: 20 minutes. This is fast time under any conditions—especially so when the necessity for a finished surface that is practically flawless is taken into consideration. Ask for further facts and figures.

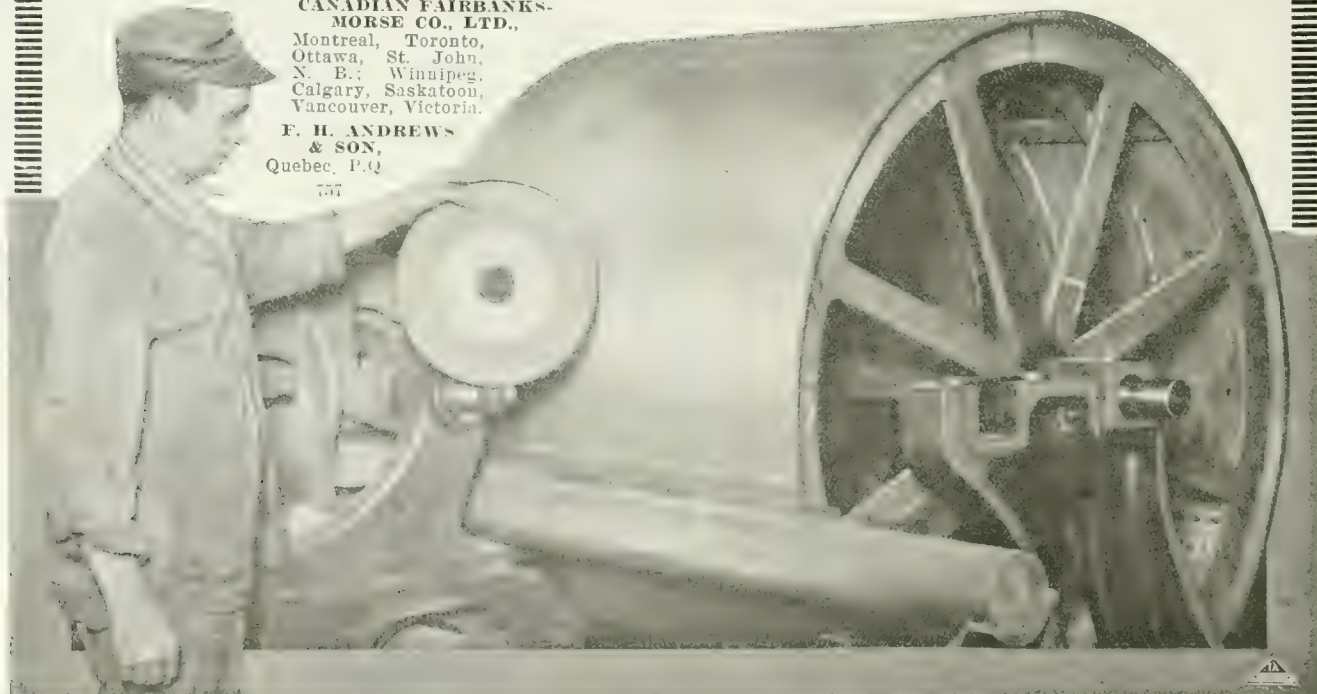
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**F. H. ANDREWS  
& SON,**  
Quebec, P.Q.

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*The advertiser would like to know where you saw his advertisement—tell him.*

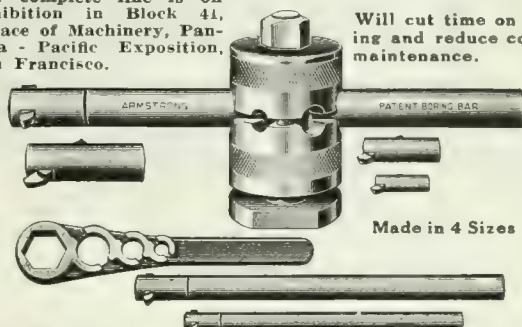




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## THE ARMSTRONG 3-BAR BORING TOOL

Our complete line is on exhibition in Block 41, Palace of Machinery, Panama - Pacific Exposition, San Francisco.

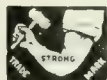


Will cut time on your boring and reduce cost of tool maintenance.

A  
Modern  
High  
Speed  
Tool

Made in 4 Sizes

Catalog  
for the  
Asking



**ARMSTRONG BROS. TOOL CO.**  
"The Tool Holder People"  
306 N. Francisco Avenue, Chicago, U.S.A.

## THE DUPONT

Patent

**Power Hammer**

BEST FOR Durability, Economy of Power, Simplicity of Adjustment.

**Seven Sizes**  
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Only High-Class Material Used and Satisfaction Guaranteed.

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**The PLESSISVILLE FOUNDRY**

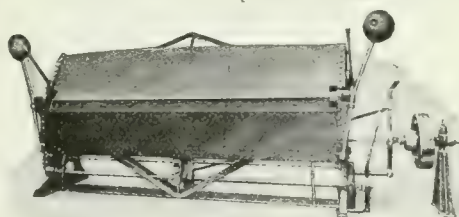
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We are exclusive Manufacturers of Steel Bending Brakes, and our product shows it.

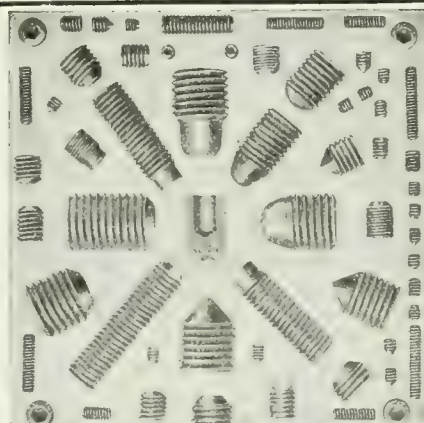


Only about three horsepower is required to operate this brake full capacity.

Catalog giving full description mailed upon request.

10 ft. for 10 Ga.

The Steel Bending Brake Works, Ltd., Chatham, Ontario



**ALLEN**  
Safety Set  
Screws, any  
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thread.

Send for  
circular  
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screws.

THE ALLEN MFG. CO., Hartford, Conn., U.S.A.  
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Hinged Pipe Vises.

Pipe Cutters. Steam and Gas Fitters' Tools.

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Either Hand or Power.

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Manufacturers of

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**GEAR & MACHINE CO.**

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**IS YOUR RIVETING  
PROFITABLY DONE?**



Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

Catalogue C tells more about it.

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Formerly John Adt & Son. Established 1866

Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.

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SPECIAL ATTENTION TO ALL SHELL MATERIALS

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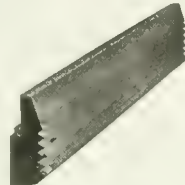
That's what this self-hardening, high-speed steel chaser does for the LANDIS DIE.

Four long cutters tangentially disposed to the work carried in suitable holders make an ideal cutting condition. This, along with its many other distinctive characteristics, has established for us a world-wide reputation.

WRITE FOR CATALOGUE NO. 21.

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Exclusive Canadian Representatives,  
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For all kinds of heavy lifting

Send for complete catalogue showing 50 styles  
10 to 100 tons capacity.

Made only by  
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Every pulley fully guaranteed.

Write for interesting printed matter.

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**WATERPROOF CEMENT  
LEATHER BELTS**

Will Save You Much Money, Time, Trouble and Worry

"Viking" Belts are just in their element when in wet places and under adverse conditions.

A trial will convince you that they are all-round savers.

Write for particulars.


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**PRESSES—ALL TYPES**

Press Attachments, Automatic.  
Metal and Wire Forming Machines.  
Tumblers—Large Line.  
Burnishing Machines, Grinders.  
Special Machines.

**Baird Machine Co., Bridgeport, Conn.**



**Detective and Stop Watch Combined.**

"We have a counter on every one of our presses, even the foot presses." This from a satisfied user of our counters. If you use presses our counters would save you money. Ask for catalog 25.



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**Dipping Baskets**



Our Copper Baskets will withstand ACID. Can be made to any shape or size. Draining facilities of our wire baskets are much greater than sheet metal construction.

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**COLD SAWS**

WITH INSERTED TEETH OF SOLID HIGH-SPEED STEEL, TREATED UNDER FULL TAYLOR-WHITE PROCESS.

Stand Pre-eminent!

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will deliver more service per dollar than any other type of belt made.

It will pay you to investigate. Write us now about your particular belt troubles.

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Over 50 years' experience building hydraulic machinery.

**WINNING THE BUYER'S FAVOR**

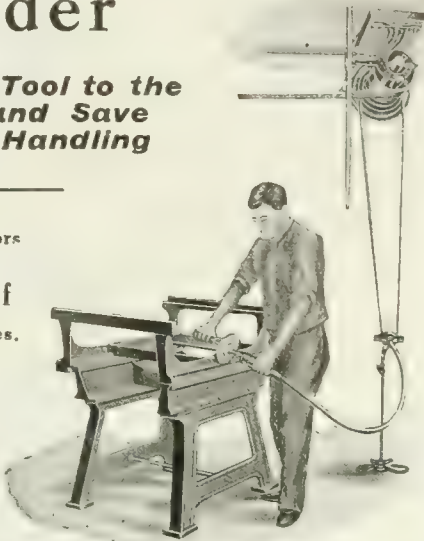
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**Take the Tool to the Work and Save Heavy Handling**

We are inventors of the  
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For all Purposes.

The oldest and largest manufacturers in the world.



CAN FURNISH MOTOR DRIVEN WHEN DESIRED

*Write Us for Catalogue and Prices.*

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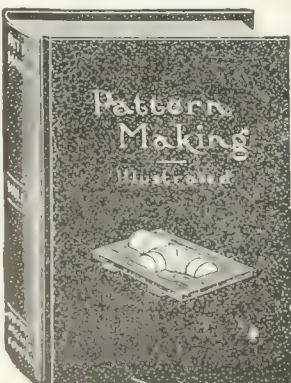
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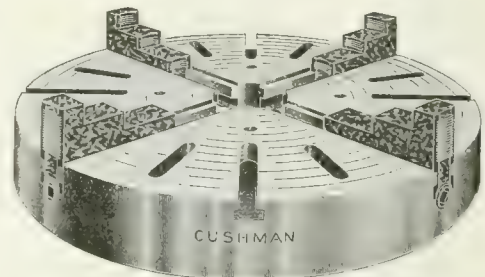
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Whiting Foundry Equipment Co., Harvey, Ill.

**Crank Pin Turning Machine.**

Niles-Bement-Pond Co., New York.

**Crimps, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Cupolas.**

Can. Buffalo Forge Co., Montreal.  
Northern Crane Works, Walkerville.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cupola and Blast Gate Blowers.**

Can. Sirocco Co., Ltd., Windsor, Ont.

**Cupola Blast Gauges & Blowers.**

Sheldons, Ltd., Galt, Ont.

**Cutters, Angle, Tee Iron and Bar.**

Can. Buffalo Forge Co., Montreal.

**Cutters, Flue.**

Independent Pneumatic Tool Co., Chicago.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Cutters, Pipe.**

Can. Fairbanks-Morse Co., Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Trimont Mfg. Co., Roxbury, Mass.

**Cutting Compound & Cutting Oil.**

Can. Economic Lubricant Co., Montreal.  
Commercial Oil Co., Hamilton, Ont.  
Crescent Oil Co., New York.

**Cutter Grinders and Attachments**

Cincinnati Milling Machine Co., Cincinnati.  
Garvin Machine Co., New York.  
Grand Machine & Tool Co., Philadelphia, Pa.

**Cutters, Milling.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Detroit Twist Drill Co., Detroit, Mich.  
Garvin Machine Co., New York.  
Morse Twist Drill and Machine Co., New Bedford.  
Tabor Mfg. Co., Philadelphia, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Cutting-off Machines.**

Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
W. P. Davis Machine Co., Rochester, N.Y.  
Earle Gear & Machine Co., Philadelphia, Pa.  
Espin-Lucas Machine Wks., Philadelphia, Pa.  
Garvin Machine Co., New York.  
Grand Machine & Tool Co., Philadelphia, Pa.  
Geo. Gorton Machine Co., Racine, Wis.  
Newton Machine Tool Works, Philadelphia, Pa.  
Nutter & Barnes Co., Hinsdale, N.H.  
Pratt & Whitney Co., Dundas, Ont.  
Q. M. S. Co., Chicago, Ill.  
Tabor Mfg. Co., Philadelphia, Pa.  
L. S. Starrett Co., Athol, Mass.

**Damper Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Derricks.**

Dominion Bridge Co., Montreal.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Designers, Special Machinery.**

Baird Machine Co., Bridgeport, Conn.  
Hooper-Falkenau Eng. Co., New York.

**Dies and Die Stocks.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Banfield, W. H. & Son, Toronto.  
Butterfield & Co., Rock Island, Que.  
Brown, Boggs & Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Duncan Electrical Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
A. B. Jardine & Co., Hespeler, Ont.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill and Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wiley & Russell, Greenfield, Mass.

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Wells Brothers Co., Greenfield, Mass.

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Tallman Brass & Metal Co., Hamilton

**Die Sinks.**

Garvin Machine Co., New York.

**Dies for Machines.**

Wells Brothers Co., Greenfield, Mass.

**Die Sinking Presses, Hydraulic.**

Charles F. Elmes Eng. Works, Chicago  
Watson-Stillman Co., Aldene, N.J.

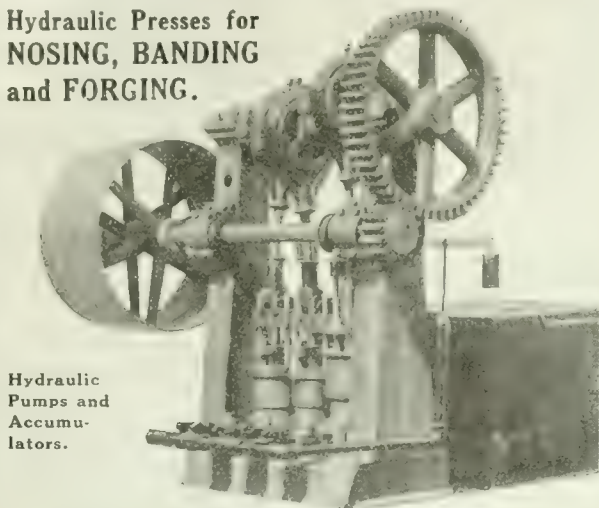
**Dies, Self-opening.**

Duncan Electrical Co., Montreal.  
Geometric Tool Co., New Haven.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Landis Machine Co., Waynesboro, Pa.  
Modern Tool Co., Erie, Pa.  
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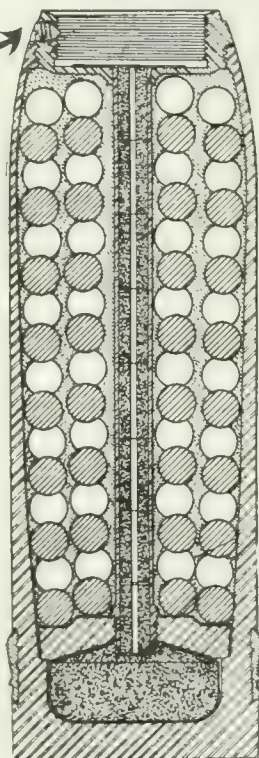
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 Duncan Electrical Co., Montreal.  
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 Greenfield, Mass.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Landis Machine Co., Waynesboro, Pa.  
 Modern Tool Co., Erie, Pa.  
 Murchey Machine & Tool Co., De-  
 troit.  
 Pratt & Whitney Co., Dundas, Ont.

**Dies for Screw Plates.**

Wells Brothers Co., Greenfield, Mass.

**Dies, Sheet Metal Working.**

E. W. Bliss Co., Brooklyn, N.Y.

Brown, Boggs & Co., Hamilton, Can.

**Dies, Screws and Thread.**

Armstrong Mfg. Co., Bridgeport, Conn.

Greenfield Tap & Die Corporation,  
 Greenfield, Mass.

Landis Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

Murchey Machine & Tool Co., De-  
 troit.

**Dies, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Draughtsman's Tools.**

Emmert Mfg. Co., Waynesboro, Pa.

**Draft, Mechanical.**

W. H. Banfield & Sons, Toronto.

Butterfield & Co., Rock Island, Que.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Windsor, Ont.

A. B. Jardine & Co., Hespeler, Ont.

Pratt & Whitney Co., Dundas, Ont.

Sheldons, Limited, Galt, Ont.

**Drift Bolt Cutters.**

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

**Drill Presses.**

Baker Bros., Toledo, O.

W. F. & John Barnes Co., Rockford,

Can. Buffalo Forge Co., Montreal.

W. P. Davis Machine Co., Rochester,

N.Y.

Hill, Clarke & Co. of Chicago, Chi-  
 cago, Ill.

Garrin Machine Co., New York.

Girard Machine & Tool Co., Phila-  
 delphia, Pa.

Niles-Bement-Pond Co., New York.

A. R. Williams Machinery Co., Tor-  
 onto.

**Drilling Machines, Locomotive**

and Multiple Spindle

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

John Bertram & Sons Co., Dundas,

Can. Fairbanks-Morse Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Colburn Mach. Tool Co., Franklin, Pa.

Garrin Machine Co., New York.

Girard Machine & Tool Co., Phila-  
 delphia, Pa.

A. B. Jardine & Co., Hespeler, Ont.

Niles-Bement-Pond Co., New York.

**Drilling Machines, Radial**

and Turret.

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

John Bertram & Sons Co., Dundas,

Can. Fairbanks-Morse Co., Montreal.

Motch & Merryweather Machy. Co.,  
 Cleveland, O.

Newton Machine Tool Works, Phila-  
 delphia, Pa.

Niles-Bement-Pond Co., New York.

Turner Machine Co., Danbury, Conn.

**Drilling Machines, Sensitive.**

Baker Bros., Toledo, O.

W. F. & John Barnes Co., Rockford,

Can. Fairbanks-Morse Co., Montreal.

Niles-Bement-Pond Co., New York.

Rockford Machine Tool Co., Rockford,

Can. Fairbanks-Morse Co., Montreal.

**Drilling Machines, Upright**

and Horizontal.

Baker Bros., Toledo, O.

Barnes Drill Co., Rockford, Ill.

Colburn Mach. Tool Co., Franklin, Pa.

W. P. Davis Machine Co., Rochester,

N.Y.

Detrick & Harvey Machine Co., Bal-  
 timore, Md.

A. R. Williams Machy. Co., Toronto

W. F. & John Barnes Co., Rockford,

John Bertram & Sons Co., Dundas,

Girard Machine & Tool Co., Phila-  
 delphia, Pa.

A. B. Jardine & Co., Hespeler, Ont.

Rockford Machine Tool Co., Rockford,

R. McDougall Co., Galt.

Motch & Merryweather Machy. Co.,  
 Cleveland, O.

Niles-Bement-Pond Co., New York.

**Drilling Posts.**

Keystone Mfg. Co., Buffalo, N.Y.

**Drills, Bench.**

W. F. & John Barnes Co., Rockford,

**Drills, Centre.**

Cleveland Twist Drill Co., Cleveland.

Detroit Twist Drill Co., Detroit, Mich.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Pratt & Whitney Co., Dundas, Ont.

L. S. Starrett Co., Athol, Mass.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drills Corner (Pneumatic).**

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

Independent Pneumatic Tool Co.,  
 Chicago, Ill.

**Drills, Electric and Portable.**

A. R. Williams Machy. Co., Toronto.

Can. Buffalo Forge Co., Montreal.

Niles-Bement-Pond Co., New York.

Stow Mfg. Co., Binghamton, N.Y.

United States Electrical Tool Co.,  
 Cincinnati, O.

**Drills, High Speed.**

Baker Bros., Toledo, O.

Cleveland Twist Drill Co., Cleveland.

Can. Fairbanks-Morse Co., Montreal.

Detroit Twist Drill Co., Detroit, Mich.

Morse Twist Drill and Machine Co.,  
 New Bedford.

W. F. & John Barnes Co., Rockford,

Ill.

Pratt & Whitney Co., Dundas, Ont.

Whitman & Barnes Mfg. Co., St.  
 Catharines, Ont.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Multiple Spindle.**

Pratt & Whitney Co., Dundas, Ont.

Niles-Bement-Pond Co., New York.

**Drills, Oil Tube.**

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Wiley & Russell, Greenfield, Mass.

**Drills, Pneumatic.**

John F. Allen Co., New York.

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

Independent Pneumatic Tool Co.,  
 Chicago, Ill.

Niles-Bement-Pond Co., New York.

**Drills, Ratchet and Hand.**

Armstrong Bros. Tool Co., Chicago.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Detroit Twist Drill Co., Detroit, Mich.

A. B. Jardine & Co., Hespeler, Ont.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

Whitman & Barnes Mfg. Co., St.  
 Catharines, Ont.

**Drills, Rock.**

A. R. Williams Machy. Co., Toronto.

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

**Drills, Track.**

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Twist.**

Armstrong, Whitworth of Canada,  
 Ltd., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

John Morrow Screw Co., Ingersoll,  
 Ont.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drill Holders.**

Wells Brothers Co., Greenfield, Mass.

**Drill Sockets.**

Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co.,  
 New Bedford.

Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drying Appliances.**

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Sheldons, Ltd., Galt, Ont.

**Drying Out Barrels.**

Baird Machine Co., Bridgeport, Conn.

**Drying Ovens.**

Oven Equipment & Mfg. Co., New  
 Haven, Conn.

Whiting Foundry Equipment Co.,  
 Harvey, Ill.

**Dump Cars.**

Can. Fairbanks-Morse Co., Montreal.

Herbert Morris Crane & Hoist Co.,  
 Ltd., Toronto.

National Machinery & Supply Co.,  
 Hamilton, Ont.

Owen Sound Iron Works Co., Owen  
 Sound.

Plessisville Foundry, Plessisville, Que.

**Dust Separators.**

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

**Dust Arresters (for Tumbling Mills).**

W. W. Sly Mfg. Co., Cleveland, O.

Whiting Foundry Equipment Co.,  
 Harvey, Ill.

**Dynamometers and Electrical Supplies.**

A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

Lancashire Dynamo and Motor Co.,  
 Ltd., Toronto.

Toronto & Hamilton Electric Co.,  
 Hamilton, Ont.

**Electrical Instruments.**

Brown Inst. Co., Philadelphia, Pa.

**Electrical Supplies.**

Duncan Electrical Co., Montreal.

**Elevator Enclosures.**

Canada Wire & Iron Goods Co.,  
 Hamilton, Ont.

Dennis Wire & Iron Works, London,  
 Ont.

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Barkey Bros., Stouffville, Ont.

Herbert Morris Crane & Hoist Co.,  
 Ltd., Toronto.

Plessisville Foundry, Plessisville, Que.

**Emery Grinders (Pneumatic).**

Barkey Bros., Stouffville, Ont.

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

Stow Mfg. Co., Binghamton, N.Y.

**Emery and Emery Wheels.**

Can. Fairbanks-Morse Co., Montreal.

Canadian Hart Wheels, Hamilton,  
 Ont.

Dom. Abrasive Wheel Co., Toronto.

Ford-Smith Machine Co., Hamilton.

Garrin Machine Co., New York.

Girard Machine & Tool Co., Phila-  
 delphia, Pa.

Stevens, F. B., Detroit, Mich.

**Emery Wheels, Dressers and Stands.**

Canadian Hart Wheels, Hamilton,  
 Ont.

Dom. Abrasive Wheel Co., Toronto.

Gardner, Robt., & Son, Montreal.

National Machinery & Supply Co.,  
 Hamilton, Ont.

Norton Co., Worcester, Mass.

**Emery Wheel Safety Flanges.**

Canadian Hart Wheels, Hamilton,  
 Ont.

**Enameling Ovens.**

Oven Equipment & Mfg. Co., New  
 Haven, Conn.

**Engines, Corliss, Compound, Pumping.**

Wm. Tod Company, Youngstown, O.

**Engines, Gas and Gasoline.**

Can. Fairbanks-Morse Co., Montreal.

Jones & Glasco, Montreal.

National Machinery & Supply Co.,  
 Hamilton, Ont.

Wm. Tod Company, Youngstown, O.

**Engines, Horizontal and Vertical.**

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

A. R. Williams Machy. Co., Toronto.

Sheldons, Ltd., Galt, Ont.

Wm. Tod Co., Youngstown, O.

**Engines, High-Speed, Automatic.**

Can. Buffalo Forge Co., Montreal.

**Engines, Steam.**

Can. Buffalo Forge Co., Montreal.

John Inglis Co., Toronto.

Plessisville Foundry, Plessisville, Que.

Wm. Tod Company, Youngstown, O.

**Engineers, Industrial.**

Hooper-Falkenau Eng. Co., New  
 York.

**Engineering Books.**

The MacLean Publishing Co., Ltd.,  
 Toronto.

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Geo. Gorton Machine Co., Racine,  
 Wis.

**Elevators and Buckets.**

Eastern Machinery Co., New Haven,  
 Conn.

Whiting Foundry Equipment Co.,  
 Harvey, Ill.

**Equipment Shop.**

Baird Machine Co., Bridgeport, Conn.

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Wm. Tod Co., Youngstown, O.

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Can. Sirocco Co., Ltd., Windsor, Ont.

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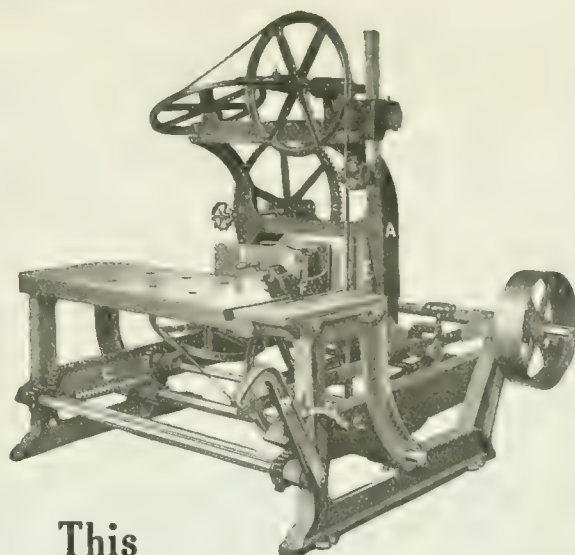
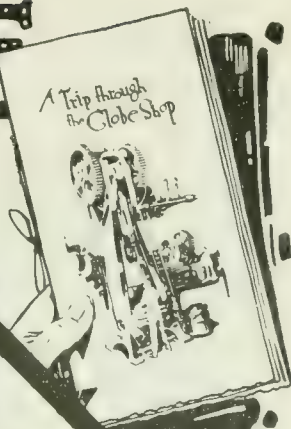
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Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Greenfield Tap & Die Corporation, Greenfield, Mass.

Holden-Morgan Co., Toronto.

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Pratt & Whitney Co., Hartford, Conn.

Garvin Machine Co., New York.

National Machinery & Supply Co., Hamilton.

**Gear-Cutting Machinery.**

Chicago Rawhide Mfg. Co., Chicago, Ill.

Girard Machine & Tool Co., Philadelphia, Pa.

Hill, Clarke & Co., of Chicago, Chicago, Ill.

Motch & Merryweather Machy. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.

Newton Machine Tool Works, Inc., Philadelphia, Pa.

A. R. Williams Machy. Co., Toronto.

Sheldons, Limited, Galt, Ont.

The Smart-Turner Machine Co., Hamilton, Ont.

Wm. Tod Co., Youngstown, O.

D. E. Whiton Machine Co., New London, Conn.

**Gears, Cut, Mortise, Angle, Worm.**

Earle Gear & Machine Co., Philadelphia, Pa.

Gardner, Robt., & Son, Montreal.

Hamilton Gear & Machine Co., Toronto.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

Jones & Glasco, Montreal, P.Q.

Philadelphia Gear Works, Philadelphia, Pa.

Smart-Turner Machine Co., Hamilton, Ont.

Wm. Tod Co., Youngstown, O.

**Gears, Rawhide.**

Chicago Rawhide Mfg. Co., Chicago, Ill.

Gardner, Robt., & Son, Montreal.

Hamilton Gear & Machine Co., Toronto.

Jones & Glasco, Montreal, P.Q.

Philadelphia Gear Works, Philadelphia, Pa.

Smart-Turner Machine Co., Hamilton, Ont.

**Generators, Electric.**

A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

Canadian Westinghouse Co., Hamilton.

Lancashire Dynamo and Motor Co., Ltd., Toronto.

Toronto and Hamilton Electric Co., Hamilton.

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Norton Co., Worcester, Mass.

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Jos. Dixon Crucible Co., Jersey City.

Stevens, F. B., Detroit, Mich.

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Herbert Morris Crane & Hoist Co., Ltd., Toronto.

**Grease Lubriko.**

Commercial Oil Co., Hamilton, Ont.

**Grinders, Automatic Knife.**

W. H. Banfield & Son, Toronto.

**Grinders, Centre, Pedestal and Bench.**

Canadian Hart Wheels, Ltd., Hamilton, Ont.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Ford-Smith Machine Co., Hamilton.

Gray Mfg. & Machine Co., Toronto.

Niles-Bement-Pond Co., New York.

Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co., New Bedford.

New Britain Machine Co., New Britain, Conn.

Norton Grinding Co., Worcester, Mass.

Stow Mfg. Co., Binghamton, N.Y.

United States Electrical Tool Co., Cincinnati, O.

**Grinders, Cutter.**

Brown & Sharpe Mfg. Co., Providence, R.I.

Greenfield Machine Co., Greenfield, Mass.

Pratt & Whitney Co., Dundas, Ont.

**Grinders, Die Chaser.**

Bignall & Keeler Mfg. Co., Edwardsville, Ill.

Landis Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

**Grinders, Disk.**

Armstrong Bros. Tool Co., Chicago, Ill.

Gardner Machine Co., Beloit, Wis.

Norton Grinding Co., Worcester, Mass.

**Grinders, Drill.**

Garvin Machine Co., New York.

United States Electric Tool Co., Cincinnati, O.

**Grinders, Cylinder, Internal.**

Bath Grinder Co., Fitchburg, Mass.

Brown & Sharpe Mfg. Co., Providence, R.I.

Fitchburg Grinder Co., Fitchburg, Mass.

Girard Machine & Tool Co., Philadelphia, Pa.

Grant Mfg. & Machine Co., Bridgeport, Conn.

Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Landis Tool Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Norton Grinding Co., Worcester, Mass.

Rivett Lathe & Grinder Co., Boston, Mass.

**Grinders, Pneumatic.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago, Ill.

**Grinders, Portable, Electric, Hand, Tool, Post, Floor and Bench.**

Baird Machine Co., Bridgeport, Conn.

Bath Grinder Co., Fitchburg, Mass.

Brown & Sharpe Mfg. Co., Providence, R.I.

Fitchburg Grinder Co., Fitchburg, Mass.

Grant Mfg. & Machine Co., Bridgeport, Conn.

Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Hisey-Wolf Machine Co., Cincinnati, O.

Landis Tool Co., Waynesboro, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Norton Co., Worcester, Mass.

United States Electrical Tool Co., Cincinnati.

A. R. Williams Machy. Co., Toronto.

**Grinders, Swing, Portable, Electric.**

Hisey-Wolf Machine Co., Cincinnati, O.

United States Electrical Tool Co., Cincinnati.

**Grinders, Tool and Holders.**

Armstrong Bros. Tool Co., Chicago.

W. F. & John Barnes Co., Rockford, Ill.

Bath Grinder Co., Fitchburg, Mass.

Blount, J. G., & Co., Everett, Mass.

Brown & Sharpe Mfg. Co., Providence, R.I.

Fitchburg Grinder Co., Fitchburg, Mass.

Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Motch & Merryweather Machy. Co., Cleveland, O.

Rivett Lathe & Grinder Co., Boston, Mass.

Tabor Mfg. Co., Philadelphia, Pa.

**Grinders, Universal, Plain.**

Girard Machine & Tool Co., Philadelphia, Pa.

Landis Tool Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

**Grinders, Vertical Surface.**

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

Girard Machine & Tool Co., Philadelphia, Pa.

Pratt & Whitney Co., Dundas, Ont.

**Grinding and Polishing Machines, Portable, Pneumatic and Spring Frame.**

Bath Grinder Co., Fitchburg, Mass.

Can. Fairbanks-Morse Co., Montreal.

Canadian Hart Wheels, Ltd., Hamilton, Ont.

Fitchburg Grinder Co., Fitchburg, Mass.

Gardner, Robt., & Son, Montreal.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Gray Mfg. & Machine Co., Toronto.

Greenfield Machine Co., Greenfield, Mass.

Hill & Sons, John H., Brantford.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Independent Pneumatic Tool Co., Chicago, Ill.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

Norton Co., Worcester, Mass.

Stow Mfg. Co., Binghamton, N.Y.

**Grinding Machines (Railroading).**

Newton Machine Tool Works, Philadelphia, Pa.

**Grinding Wheels.**

Can. Fairbanks-Morse Co., Montreal.

Canadian Hart Wheels, Ltd., Hamilton, Ont.

Carborundum Co., Niagara Falls.

Dom. Abrasive Wheel Co., Toronto.

Ford-Smith Machine Co., Hamilton, Canada.

Gray Mfg. & Machine Co., Toronto.

Norton Co., Worcester, Mass.

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Dennis Wire & Iron Works Co., Ltd., London, Canada.

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Victor Saw Works, Ltd., Hamilton, Canada.

Diamond Saw & Stamping Works, Buffalo, N.Y.

L. S. Starrett Co., Athol, Mass.

**Hack Saw Frames.**

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Garvin Machine Co., New York City.

Mussens, Limited, Montreal.

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High Speed Hammer Co., Rochester, N.Y.

**Hammers, Drop and Belt Driven.**

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Brown, Boggs Co., Ltd., Hamilton, Canada.

Canadian Billings & Spencer, Ltd., Welland.

A. B. Jardine & Co., Hespeler, Ont.

Girard Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Plessisville Foundry, Plessisville, Que.

Toledo Machine & Tool Co., Toledo, Ohio.

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West Tire Setter Co., Rochester, N.Y.

**Hammers, Pneumatic.**

Independent Pneumatic Tool Co., Chicago, Ill.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

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Chicago Rawhide Mfg. Co., Chicago, Ill.

**Hammers, Steam.**

John Bertram & Sons Co., Dundas.

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National Machinery & Supply Co., Hamilton.

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Whiting Foundry Equipment Co., Harvey, Ill.

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Chicago Rawhide Mfg. Co., Chicago, Ill.

Graton & Knight Mfg. Co., Montreal.

**Hangers.**

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Gardner, Robt., & Son, Montreal.

The Smart-Turner Machine Co., Hamilton.

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Shore Instrument & Mfg. Co., New York.

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Can. Sirocco Co., Ltd., Windsor, Ont.

Hooper-Falkenau Eng. Co., New York.

Sheldons, Ltd., Galt, Ont.

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Baird Machine Co., Bridgeport, Conn.

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London Bolt & Hinge Works, London, Ont.

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Southwark Foundry & Machine Co., Philadelphia.

Watson-Stillman Co., Aldene, N.J.

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Owen Sound Iron Works Co., Owen Sound.

Southwark Foundry & Machine Co., Philadelphia.

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Northern Crane Works, Walkerville.





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## SPEED and ACCURACY

The two most important factors in the machining of shell and 45 shells, speed and accuracy, can be achieved when turning copper bands by using this machine.

The cut at the left shows an operator turning copper bands on our machine. His daily output averages 10 to 15 shells per hour.

This lathe was designed and built by us especially for this work. It is of sufficiently heavy construction to enable it to stand up under the strenuous work demanded of shell-making machinery.

Most of the largest manufacturers have found it profitable to adopt it. Let us tell you why. We invite your inquiry.

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Morton Mfg. Co., Muskegon Heights, Mich.

Newton Machine Tool Works, Philadelphia, Pa.

A. R. Williams Machy. Co., Toronto.

**Kilns.**

Can. Buffalo Forge Co., Montreal.

Sheldons, Limited, Galt, Ont.

**Lacquering Ovens.**

Oven Equipment & Mfg. Co., New Haven, Conn.

**Lacing, Belt.**

Chicago Rawhide Mfg. Co., Chicago, Ill.

**Ladles, Foundry.**

Northern Crane Works, Walkerville.

Whiting Foundry Equipment Co., Harvey, Ill.

**Lag Screw Gimlet Pointers.**

National Machy. Co., Tiffin, Ohio.

**Lamps, Arc and Incandescent.**

Can. Fairbanks-Morse Co., Montreal.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Ker & Goodwin, Brantford.

**Lathe Chucks.**

Ker & Goodwin, Brantford.

**Lathe Attachment for Shells.**

Lymburner, Ltd., Montreal.

**Lathe, Automatic.**

Windsor Machine Co., Windsor, Vt.

**Lathe Dogs and Attachments.**

Armstrong Bros. Tool Co., Chicago.

Bridgeford Machine Tool Works, Rochester, N.Y.

Fay & Scott, Dexter, Maine.

Hendey Machine Co., Torrington, Conn.

J. H. Williams Co., Brooklyn, N.Y.

**Lathe, Bench.**

W. F. & John Barnes Co., Rockford.

Blount, J. G., & Co., Everett, Mass.

Can. Fairbanks-Morse Co., Montreal.

Pratt & Whitney Co., Dundas, Ont.

**Lathe, Engine.**

A. R. Williams Machy. Co., Toronto.

Barnes Drill Co., Rockford, Ill.

W. F. & John Barnes Co., Rockford, Ill.

John Bertram & Sons Co., Dundas.

Bridgeford Machine Tool Works, Rochester, N.Y.

Can. Fairbanks-Morse Co., Montreal.

Cincinnati Iron & Steel Co., Cincinnati, O.

W. P. Davis Machine Co., Rochester, N.Y.

Fay & Scott, Dexter, Maine.

Gardner, Robt., & Son, Montreal.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Hendey Machine Co., Torrington, Conn.

Hill, Clarke & Co., of Chicago, Inc., Chicago, Ill.

R. McLaughlin Co., Galt.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rahn-Larson Co., Cincinnati, O.

**Lathe, Extension Gap.**

Barnes Drill Co., Rockford, Ill.

**Lathe Pans.**

New Britain Machine Co., New Britain, Conn.

**Lathe, Patternmakers'.**

J. G. Blount Co., Everett, Mass.

Fay & Scott, Dexter, Maine.

Mussens, Limited, Montreal.

**Lathe, Screw Cutting.**

A. R. Williams Machy. Co., Toronto.

Barnes Drill Co., Rockford, Ill.

John Bertram & Sons Co., Dundas.

Cincinnati Iron & Steel Co., Cincinnati, O.

Girard Machine & Tool Co., Philadelphia, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

**Lathe, Spinning.**

Bliss, E. W., Co., Brooklyn, N.Y.

Toledo Mach. & Tool Co., Toledo, O.

**Lathe, Turret and Speed.**

Acme Machine Tool Co., Cincinnati, O.

John Bertram & Sons Co., Dundas.

Blount, J. G., & Co., Everett, Mass.

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

Cincinnati Iron & Steel Co., Cincinnati, O.

Colburn Machine Tool Co., Franklin, Pa.

W. P. Davis Machine Co., Rochester.

Fay & Scott, Dexter, Maine.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

New Britain Machine Co., New Britain, Conn.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rahn-Larson Co., Cincinnati, O.

A. O. Walworth & Co., Chicago, Ill.

Warner & Swasey Co., Cleveland, O.

Windsor Machine Co., Windsor, Vt.

A. R. Williams Machy. Co., Toronto.

**Leather, Cup.**

Chicago Rawhide Mfg. Co., Chicago, Ill.

**Leather, Pump, Valve,**

Chicago Rawhide Mfg. Co., Chicago, Ill.

**Leather Strapping.**

Graton & Knight Mfg. Co., Montreal.

**Lifts, Pneumatic.**

Whiting Foundry Equipment Co., Harvey, Ill.

**Link Belting.**

Can. Fairbanks-Morse Co., Montreal.

Graton & Knight Mfg. Co., Montreal.

Jones & Glasco, Montreal.

**Linoleum Mill Machinery.**

Bertrams, Ltd., Edinburgh, Scotland.

**Liquid Air.**

L'Air Liquide Society, Montreal, Toronto.

**Lockers, Steel Wardrobe and Steel Material.**

Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

Lockers, Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

**Locomotive Equipment.**

Can. Locomotive Co., Kingston, Ont.

**Locomotives, Railroad, Contracting.**

Can. Locomotive Co., Kingston, Ont.

National Machinery & Supply Co., Hamilton.

**Locomotives, Turn Tables.**

Can. Bridge Co., Walkerville, Ont.

**Lubricants.**

Can. Economic Lubricant Co., Montreal.

Cataract Refining Co., Toronto.

Commercial Oil Co., Hamilton, Ont.

**Machine Divided Rules.**

Lufkin Rule Co., Saginaw, Mich.

**Machine Tools.**

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

Modern Tool Co., Erie, Pa.

Newton Machine Tool Works, Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

J. H. Williams Co., Brooklyn, N.Y.

**Machinery Dealers.**

Can. Fairbanks-Morse Co., Montreal.

National Machinery & Supply Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

**Machinery Guards.**

Jones & Glasco, Montreal, P.Q.

Canada Wire & Iron Goods Co., Hamilton, Ont.

A. R. Williams Machy. Co., Toronto.

**Machinery Repairs.**

Cunningham & Sons, St. Catharines, Ont.

Plessisville Foundry, Plessisville, Que.

Machinists' Scales, Small Tools and Supplies.

Can. Fairbanks-Morse Co., Montreal.

Frank H. Scott, Montreal.

J. H. Williams & Co., Brooklyn, N.Y.

**Mandrels.**

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

A. B. Jardine & Co., Hespeler, Ont.

Modern Twist Drill and Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

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Cunningham & Sons, St. Catharines, Ont.

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Holden-Morgan Co., Toronto.

Noble & Westbrook Mfg. Co., Hartford, Conn.

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Dennis Wire & Iron Works, London, Ont.

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Lufkin Rule Co., of Canada, Windsor, Ont.

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Hooper-Falkenau Eng. Co., New York.

**Metallurgists.**

Toronto Testing Laboratory, Ltd., Toronto.

**Metal Cutting Machines.**

Racine Tool & Machine Co., Racine, Wis.

**Metal Stamping.**

Duncan Electrical Co., Montreal.

**Meters, Electrical.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.

**Mill Machinery.**

Cunningham & Sons, St. Catharines, Ont.

Alexander Fleck, Ltd., Ottawa.

**Milling Attachments.**

John Bertram & Sons Co., Dundas.

Brown & Sharpe Mfg. Co., Providence.

Cincinnati Milling Machine Co., Cincinnati.

Hendey Mach. Co., Torrington, Conn.

Kearney & Trecker Co., Milwaukee.

Kemp Smith Mfg. Co., Milwaukee, W.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

**Milling Machines, Horizontal and Vertical.**

A. R. Williams Machy. Co., Toronto.

Brown & Sharpe Mfg. Co., Providence.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

John Bertram & Sons Co., Dundas.

Girard Machine & Tool Co., Philadelphia, Pa.

Gooley & Edmund, Cortland, N.Y.

Kearney & Trecker Co., Milwaukee.

Kemp Smith Mfg. Co., Milwaukee, W.

Motch & Merryweather Machy. Co., Cleveland, O.

Newton Machine Tool Works, Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

Crescent Oil Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

**Milling Machines, Keyseat.**

Newton Machine Tool Works, Philadelphia, Pa.

**Milling Machines, Multiple Spindle, Duplex, Etc.**

Newton Machine Tool Works, Philadelphia, Pa.

**Milling Machines, Plain, Bench and Universal.**

Brown & Sharpe Mfg. Co., Providence, R.I.

Cincinnati Milling Machine Co., Cincinnati.

Garvin Machine Co., New York.

Gooley & Edmund, Cortland, N.Y.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Hendey Machine Co., Torrington.

Kearney & Trecker Co., Milwaukee.

Kemp Smith Mfg. Co., Milwaukee, Wis.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

A. R. Williams Machy. Co., Toronto.

**Milling Machines, Profile.**

Brown & Sharpe Mfg. Co., Providence.

Can. Fairbanks-Morse Co., Montreal.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Pratt & Whitney Co., Dundas, Ont.

Brown & Sharpe Mfg. Co., Providence.

Geometric Tool Co., New Haven, Conn.

Kemp Smith Mfg. Co., Milwaukee, W.

Mine Cars and Hitchings.

Pratt & Whitney Co., Dundas, Ont.

Modern Tool Co., Erie, Pa.

Can. Fairbanks-Morse Co., Montreal.

**Mining Machinery.**

A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

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Toronto & Hamilton Electric Co., Hamilton, Ont.

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Jones & Glasco, Montreal.

**Motors, Electric.**

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Can. Fairbanks-Morse Co., Montreal.

Lancashire Dynamo & Motor Co., Ltd., Toronto.

Toronto & Hamilton Electric Co., Hamilton, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago.

**Multiple Index Centres.**

Garvin Machine Co., New York.

**Nipple Threading Machines.**

John H. Hall & Sons, Ltd., Brantford, Ont.

Landis Machine Co., Waynesboro, Pa.

**Nitrogen.**

L'Air Liquide Society, Montreal, Toronto.

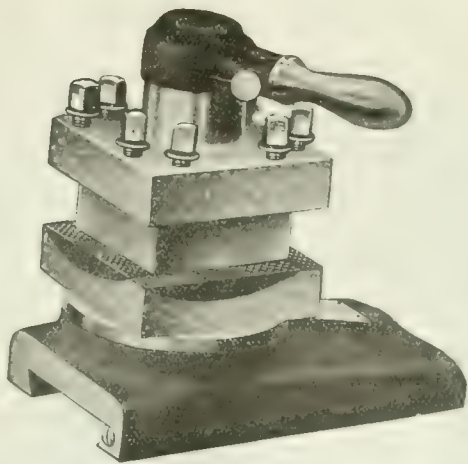
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Can. Buffalo Forge Co., Montreal.

**Nuts, Semi-Finish and Finished.**

Galt Machine Screw Co., Galt, Ont





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Your Lathe Needs A NEW TOOL POST, One of the Modern Multiple Type.

You can no longer afford to use the old style single tool holder.

Give us the size of the dovetail on your lathe carriage and height to lathe center; we will quote you price on a Modern Tool Holder that we guarantee will increase your production, and give you some interesting facts about Lathe Turrets.

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Cut shows two 3-motor, 10-ton lattice girder travelers in Canadian Pacific Railway Shops, Montreal, P.Q. Over 200 cranes sold this one company.

Any capacity, span or type.

Send for catalog 110.

Cranes  
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Kinds



Complete  
Foundry  
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are very popular tools on  
Lyddite and Shrapnel

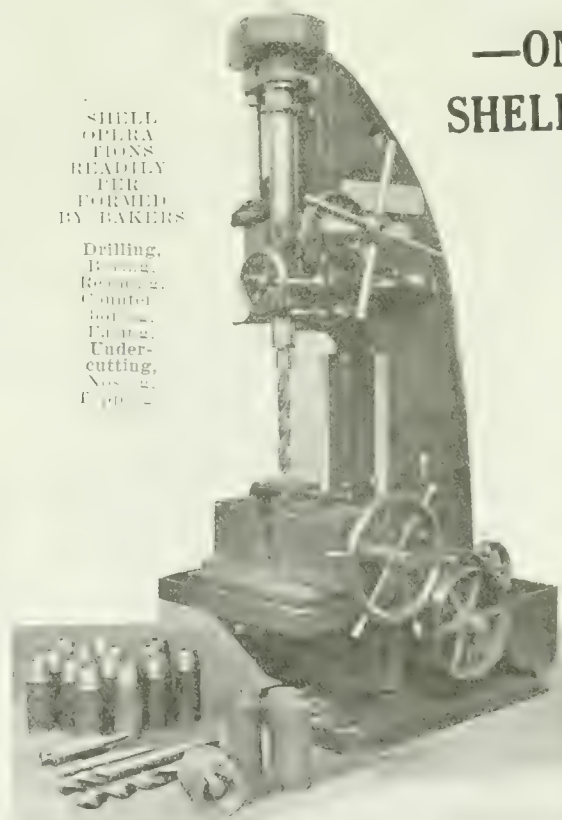
The Baker Bros. Machine with its fast running gears and remarkable power and rigidity piles it on a high-speed drill to the limit and ensures a maximum of accuracy and output.

Gives the highest standard to output at extremely low labor cost, low installation cost and small floor space.

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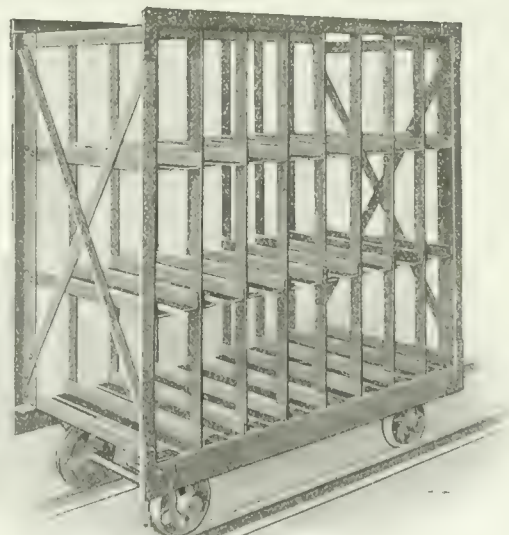


**One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.**

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of pre-heated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.



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Nutter & Barnes Co., Hinsdale, N.H.

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Espen-Lucas Machine Works, Philadelphia, Pa.  
Huther Bros. Saw Mfg. Co., Rochester, N.Y.  
Q. M. S. Co., Chicago, Ill.  
Tabor Mfg. Co., Philadelphia, Pa.

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Ford-Smith Machine Co., Hamilton.  
Garvin Machine Co., New York.  
L. S. Starrett Co., Athol, Mass.

**Saws, Circular Metal.**

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Espen-Lucas Machine Works, Philadelphia, Pa.  
Hub Machine Welding & Contracting Co., Philadelphia, Pa.  
Hunter Saw & Machine Co., Pittsburgh, Pa.  
Huther Bros. Saw Mfg. Co., Rochester, N.Y.  
Tabor Mfg. Co., Philadelphia, Pa.

**Saws, Hot and Cold.**

Earle Gear & Machine Co., Philadelphia, Pa.  
Hunter Saw & Machine Co., Pittsburgh, Pa.  
Huther Bros. Saw Mfg. Co., Rochester, N.Y.  
Nutter & Barnes Co., Hinsdale, N.H.  
Q. M. S. Co., Chicago, Ill.  
Vulcan Eng. Sales Co., Chicago, Ill.

**Scleroscopes.**

Shore Instrument & Mfg. Co., New York City.

**Screws, Caps and Set.**

Galt Machine Screw Co., Galt, Ont.  
John Morrow Screw Co., Ingersoll, Ont.

**Screw Machine Products.**

Galt Machine Screw Co., Galt, Ont.  
John Morrow Screw Co., Ingersoll, Ont.

**Screw Machines, Hand.**

Wallace, Barnes Co., Bristol, Conn.  
Automatic.

Acme Machine Tool Co., Cincinnati, O.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

Hill, Clarke & Co., of Chicago, Chicago, Ill.  
A. B. Jardine & Co., Hespeler.

Motch & Merryweather Machy. Co., Cleveland, O.  
National Mach. & Sup. Co., Hamilton.

New Britain Machine Co., New Britain, Conn.  
Pratt & Whitney Co., Dundas, Ont.

A. O. Walworth & Co., Chicago, Ill.  
Warner & Swasey Co., Cleveland, O.  
A. R. Williams Machy. Co., Toronto.

Windsor Machine Co., Windsor, Vt.

**Screw Machines, Multiple**

**Spindle.**  
New Britain Machine Co., New Britain, Conn.  
Windsor Machine Co., Windsor, Vt.

**Screw Plates.**

Butterfield & Co., Rock Island, Que.  
Can. Tap & Die Co., Galt, Ont.

A. B. Jardine & Co., Hespeler.  
Morse Twist Drill & Machine Co., New Bedford.

Wells Brothers Co., Greenfield, Mass.  
Wiley & Russell Co., Greenfield, Mass.

**Screw Slotters.**

Garvin Machine Co., New York.  
Pratt & Whitney Co., Dundas, Ont.

**Set Screws, Safety.**

Allen Mfg. Co., Hartford, Conn.

**Second-Hand Machinery.**

New York Machinery Co., New York.  
Gardner, Robt. & Son, Montreal.

Can. Drawn Steel Co., Hamilton, Ont.  
Gardner, Robt. & Son, Montreal.  
National Mach. & Sup. Co., Hamilton.

Niles-Bement-Pond Co., New York.  
Plessisville Foundry, Plessisville, Que.  
The Smart-Turner Machine Co., Hamilton.

Union Drawn Steel Co., Hamilton.

**Shanks, Straight and Taper.**  
Jacobs Mfg. Co., Hartford, Conn.

**Shapers.**

John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
W. F. Davis Machine Co., Rochester, N.Y.

Gardner, Robt. & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hendey Machine Co., Torrington, Ct.

Hill, Clarke & Co., of Chicago, Chicago, Ill.  
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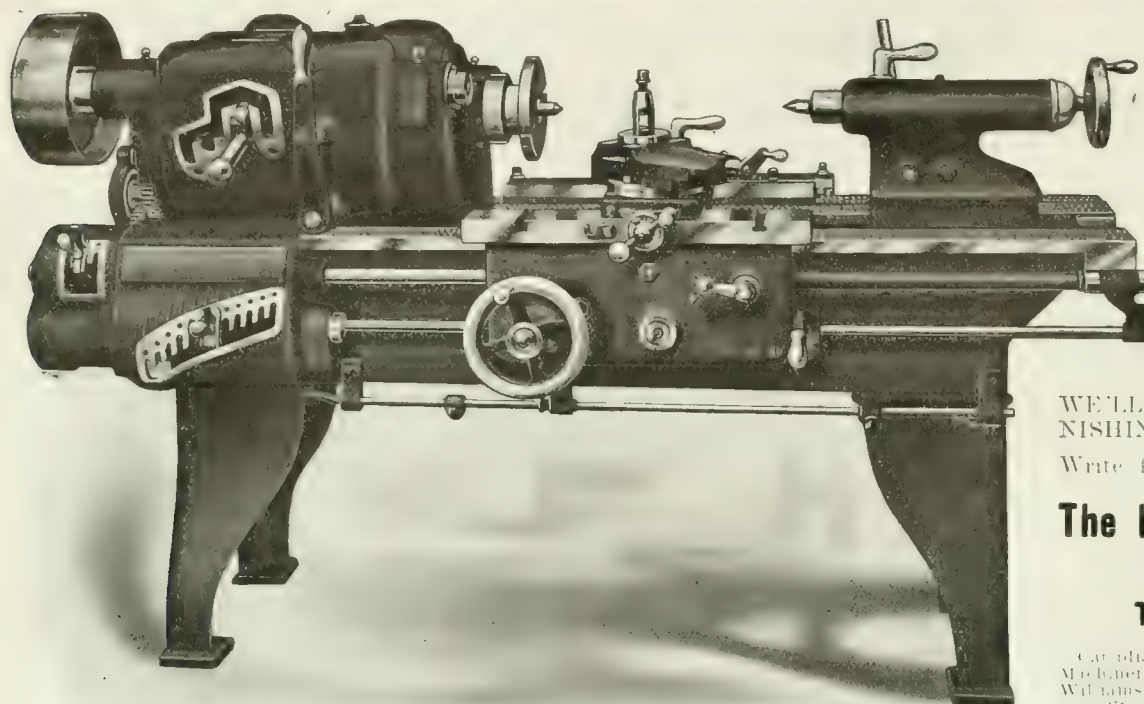


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# HENDEY 18-Inch GEARED HEAD LATHE

8 mechanical changes of speed for spindle with driving shaft running at constant speed, 4 direct and 4 through back gears.



36 DIFFERENT THREADS AND FEEDS are had through Mounted Change Gearing, each change being quickly made through controlling handles in Gear Boxes.

BEFORE PURCHASING A NEW LATHE INVESTIGATE THE HENDEY SERVICE.

WE'LL HELP YOU BY FURNISHING LIST OF USERS.

Write for descriptive circular.

**The Hendey Machine Company**  
Torrington, Conn.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 230 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

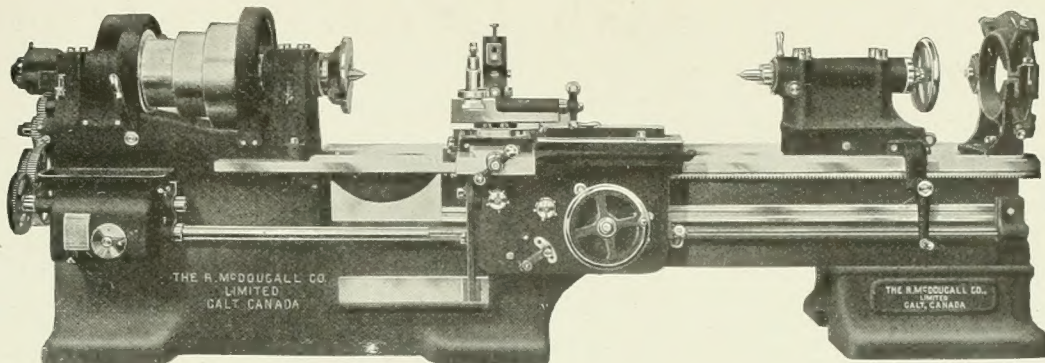
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## McDougall Gap Lathes

—  
Strength  
Accuracy  
Quality



Take a look at the next money you intend to invest in a Lathe.  
Then, take a look at the money's worth we offer you in our machine.  
Your money will soon come back to you in increased production and we  
will have the pleasure of having a satisfied user. Our machines are just as  
good as they look and they look good too.  
We invite the closest inspection.

Particulars on request.

### The R. McDougall Company Limited

Manufacturers

GALT, Ont., Canada

The Canadian Fairbanks-Morse Co., Limited, Sales Agents.



*Little Giant*

## CYLINDRICAL LIMIT GAGES

For shell work this style of gage is most efficient  
and economical.

### PROMPT SHIPMENT.

We maintain a large stock at all times.

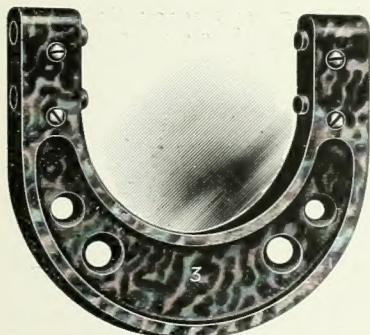
These can be shipped set to special limits specified  
by the customer within **48 hours** from receipt of order.

Gages set to special limits and with setting plugs can  
be shipped in 7 to 10 days.

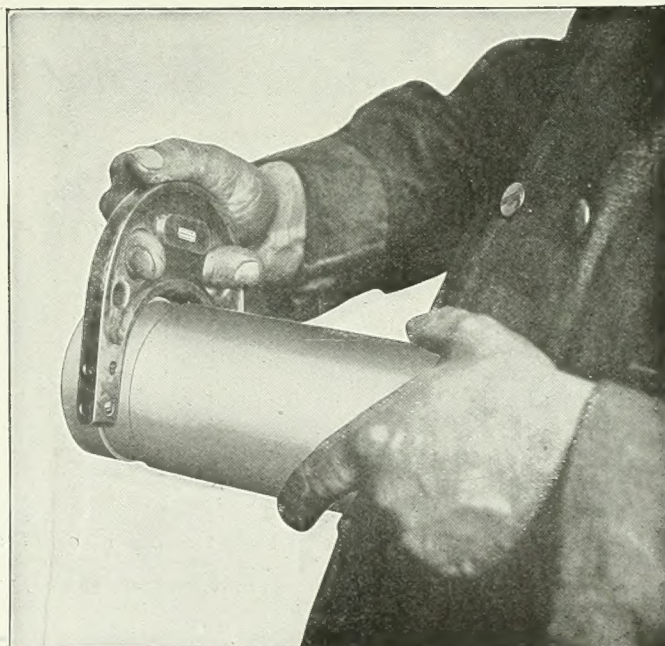
### THREAD LIMIT GAGES.

For every form and style of screw thread.

Send for our Gage Catalog.



The upper  
points are set  
in maximum  
limits — the  
lower points  
to minimum  
limits. Points  
can be sealed  
to prevent  
tampering.



## Wells Brothers Company of Canada, Limited

GALT, ONT.

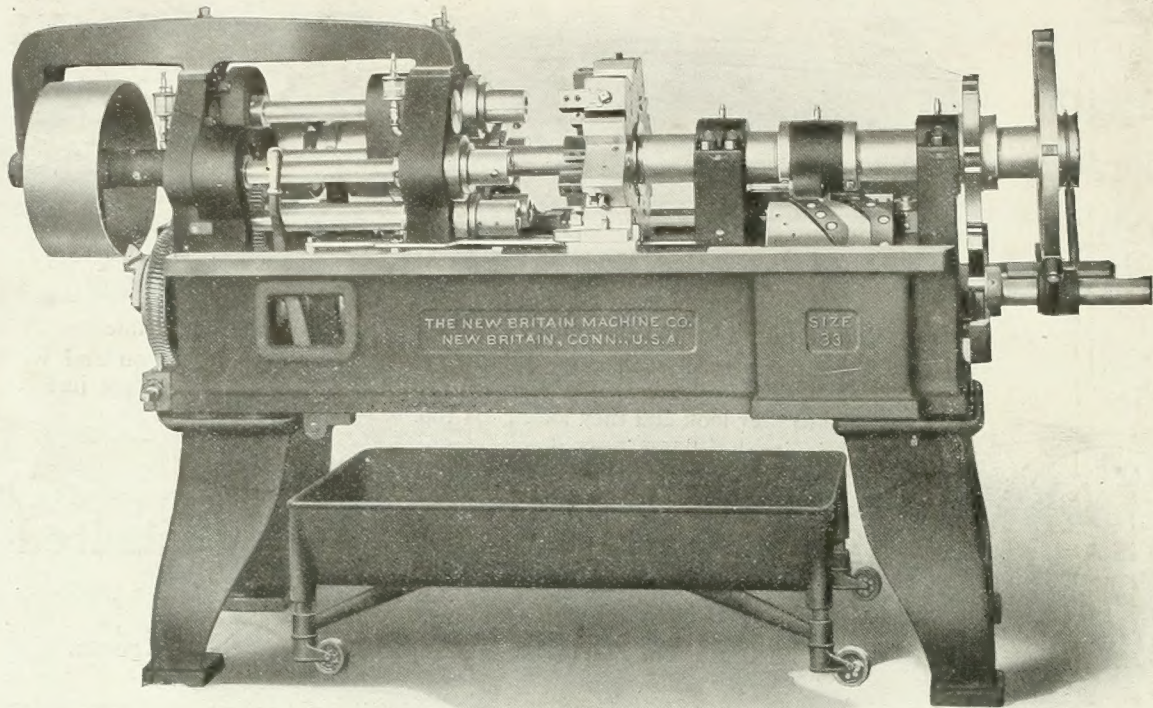
Sales Agents:

The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto,  
Vancouver, Winnipeg, St. John, Calgary.

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# THE MACHINE FOR SHELL PARTS

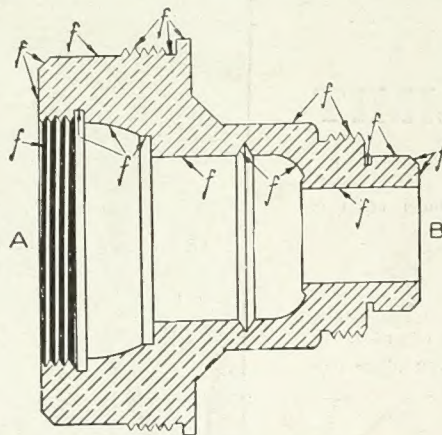


**80 TIME FUSE HEADS PER HOUR!**

**Labor Cost :**

**37½ Cents Per 100**

This Shrapnel Time Fuse Head is machined **complete** at two settings in Size 33 Automatic Five-Spindle Single Head Chucking Machine.



**Material: Aluminum Casting Operations:**

End A — Turned three diameters; counterbored three diameters; inside formed two diameters; end faced; undercut back of thread inside and out *at same time*; grooved inside; and tapped and threaded *simultaneously* at the rate of 160 per hour. End B—Turned three diameters; and flange faced, necked and threaded at the rate of 160 per hour.

**1 Man + 1 "New Britain" Chucking Machine = 7 Men + 8 Other Machines**

The equation above illustrates the great saving in cost of equipment, floor space and labor expenditure resulting from the use of "New Britains." In this instance one Automatic Multiple Spindle Chucking Machine displaced eight machines and seven operators and produced the same output. Neither is this an extreme case.

**Single Head Machines in Four Sizes**

Send us sample or blue-print of some of your work and let us show you how many hundred per cent. your production could be increased by a "New Britain."

**Double Head Machines in Three Sizes**

**The New Britain Machine Company**  
NEW BRITAIN, CONN., U.S.A.

*The advertiser would like to know where you saw his advertisement—tell him.*







